

PRINTER: **STAR®** **MODEL GEMINI-10X**



TECHNICAL SERVICE DATA FOR YOUR PRINTER

PRELIMINARY SERVICE CHECKS

This data provides the user with a time-saving service tool which is designed for quick isolation and repair of printer malfunctions.

Check all interconnecting cables for good connection and correct hook-up before making service checks.

Replacement or repair of CPU board or connectors may be necessary after the malfunction has been isolated.

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
Scope
Logic Probe

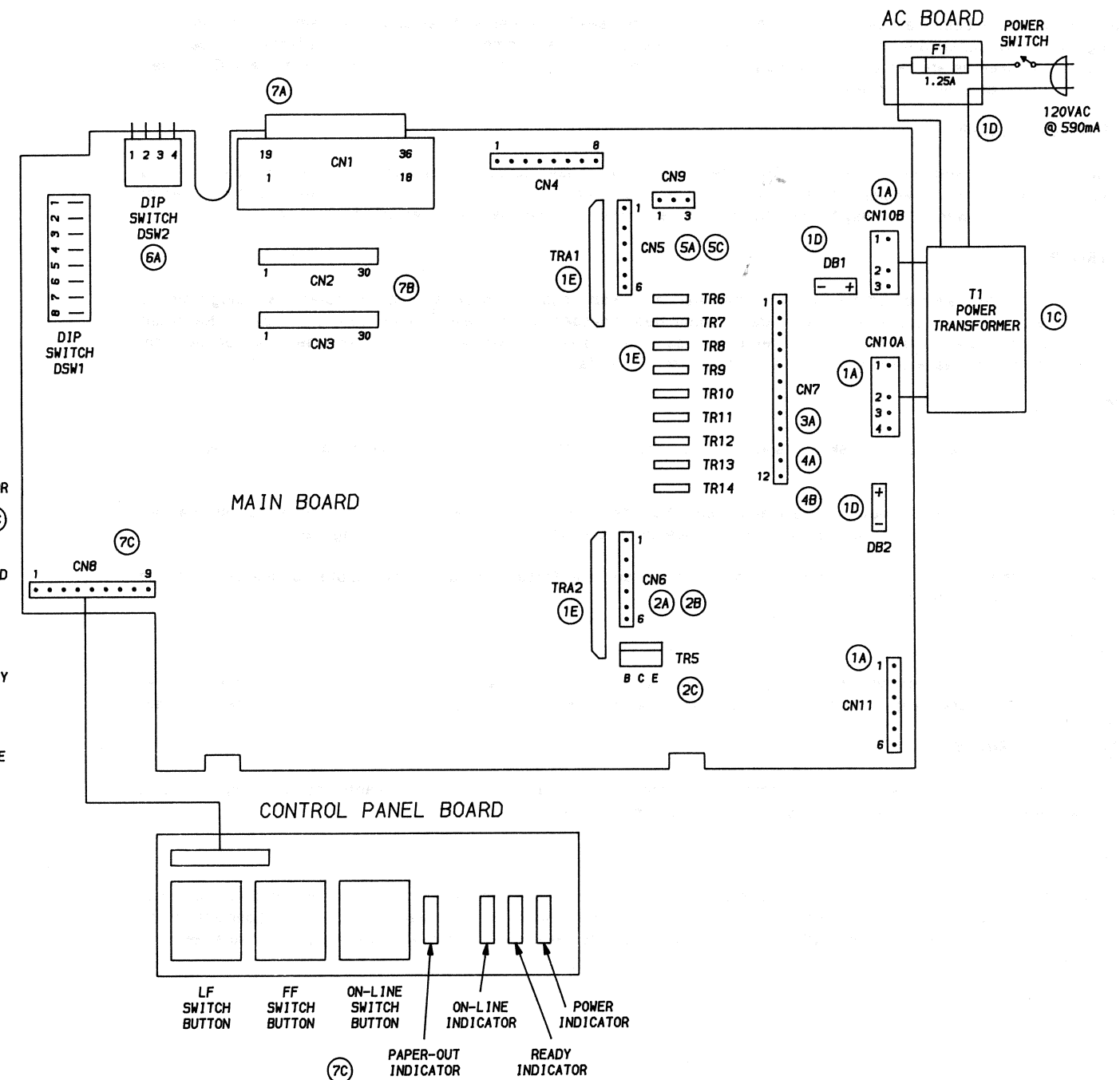
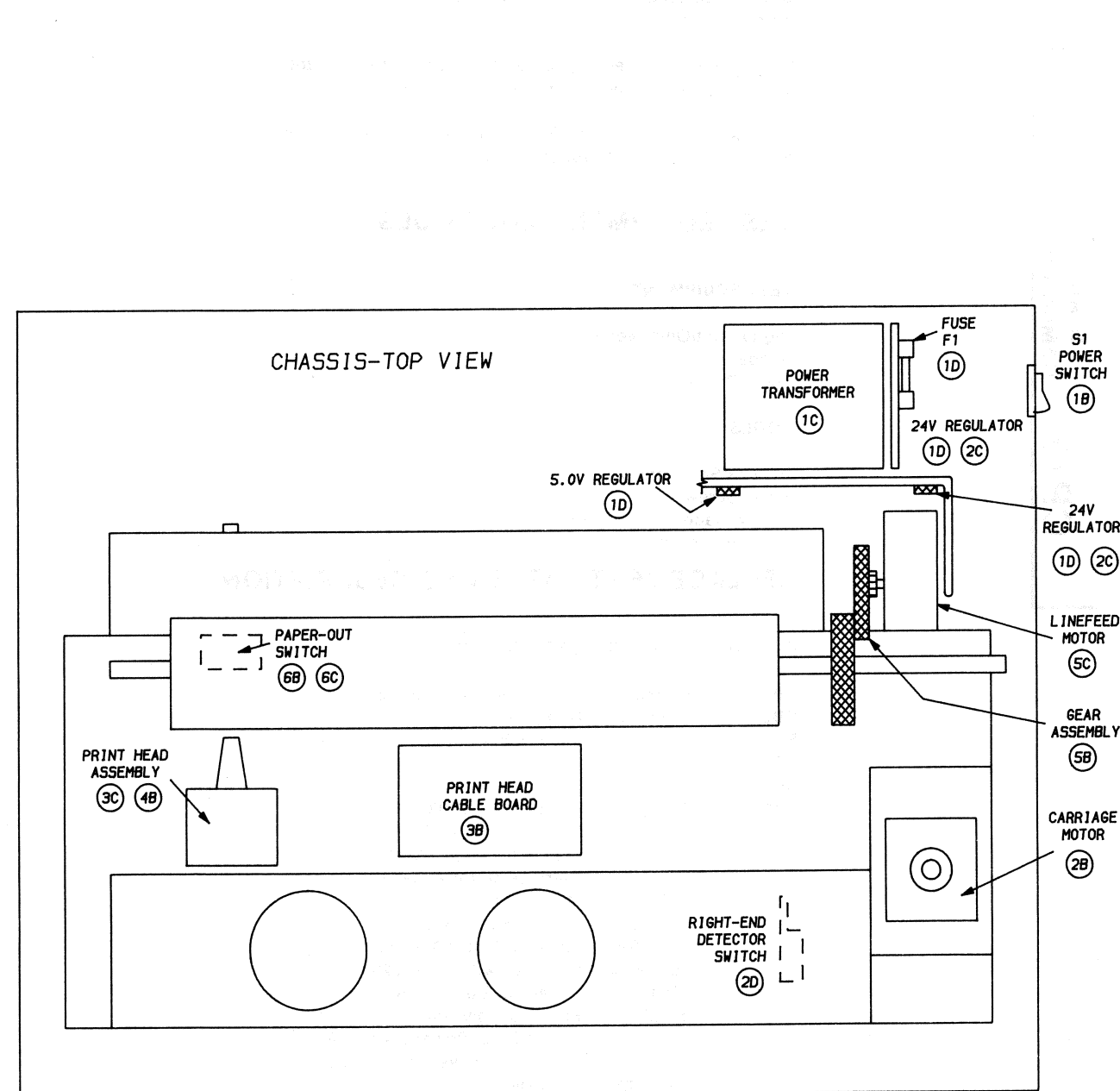
TOOLS

Phillips Screwdriver
Small Screwdriver
Low Voltage Soldering Iron
Desoldering Iron

REPLACEMENT PARTS AND DESCRIPTION

ITEM NO.	PART NO.	DESCRIPTION
DB1	08990202	Bridge Rectifier, KBL02
DB2	08990202	Bridge Rectifier, KBL02
F1	09990020	Fuse, 1.25A @125V Slow-Blow
TR6 thru		
TR14	07309861	Transistor, 2SD986
TRA1	07650003	Transistor Array, PU4124
TRA2	07650003	Transistor Array, PU4124
	87041011	Carriage Motor Assembly
	87222021	Main Board
	87220320	Control Panel Board
	87041020	Linefeed Motor Assembly
	09010024	On-Line Switch, J-P5029
	87045041	Paper-Out Detector Switch
	87223010	Power Supply Unit (Includes Power Cord, Power Switch, AC Board and Power Transformer)
	89070000	Print Head
	87045010	Print Head Cable Board
	87049040	Right-End Detector Switch
	08200043	5.0V Regulator, 7805A
	07312771	24V Regulator, 2SD1277

PRELIMINARY SERVICE CHECKS (Continued)



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PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

SEE INTERCONNECTING DIAGRAM, PLACEMENT CHART, AND PHOTOS TO MATCH THE NUMBER IN THE CIRCLES WITH THOSE IN THE FOLLOWING DATA FOR SERVICE CHECKS TO BE PERFORMED.

①

POWER SUPPLY

- (A) Check Connectors CN10A, CN10B and CN11 for good connections.
- (B) Check for an open Power Switch (S1) or an open power cord.
- (C) Check the Power Transformer (T1) for an open winding.
- (D) Check AC Fuse F1. If the fuse is open, check the Power Transformer, Bridge Rectifiers (DB1 and DB2), the 5.0V Regulator and the 24V Regulator Transistors for possible shorts.
- (E) Check Print Head Driver Transistors TR6 thru TR14, Linefeed Motor Driver TRA1 and Carriage Motor Driver TRA2 for shorts.

②

PRINTER CARRIAGE ASSEMBLY DOES NOT MOVE

- (A) Check Connector CN6 for a good connection.
- (B) Check the resistance of the Carriage Motor windings. Unplug Connector CN6 and check for 11.3 ohms between pins 2 and 3, pins 2 and 4, pins 1 and 5 and pins 1 and 6. If the resistance of any winding is abnormal, replace the Carriage Motor.
- (C) Check for 24.5V at the emitter of Transistor TR5. If the voltage is missing, check the power supply.
- (D) Check for a shorted Right-End Detector Switch.

③

PRINT HEAD WILL NOT PRINT

- (A) Check Connector CN7 for good connections.
- (B) Check for a defective Head Cable Board. If the board is defective, replace the Print Head Cable Board.
- (C) Check for a defective Print Head.

④

MISSING DOTS IN THE PRINT PATTERN

- (A) Check Connector CN7 for good connections.
- (B) Disconnect Connector CN7 and check the resistances of the Print Head solenoids. Measure between pin 6 and pins 1 thru 5 and pins 9 thru 12 of Connector CN7. If any solenoid is open, replace the Print Head.

⑤

LINE FEED WILL NOT OPERATE

- (A) Check Connector CN5 for good connections.
- (B) If the Linefeed Motor turns but the paper does not feed when the L.F. Button is pressed, check the operation of the gear assembly on the right side of the platen. If the gear assembly is not operating, check for a broken gear.
- (C) If the Linefeed Motor is inoperative, check the resistance of the Linefeed Motor windings. Unplug Connector CN5 and check for a resistance of approximately 51 ohms between pins 2 and 3, pins 2 and 4, pins 1 and 5 and pins 1 and 6. If the resistance of any of the windings is abnormal, replace the Linefeed Motor.

⑥

PAPER-OUT NOT DETECTED

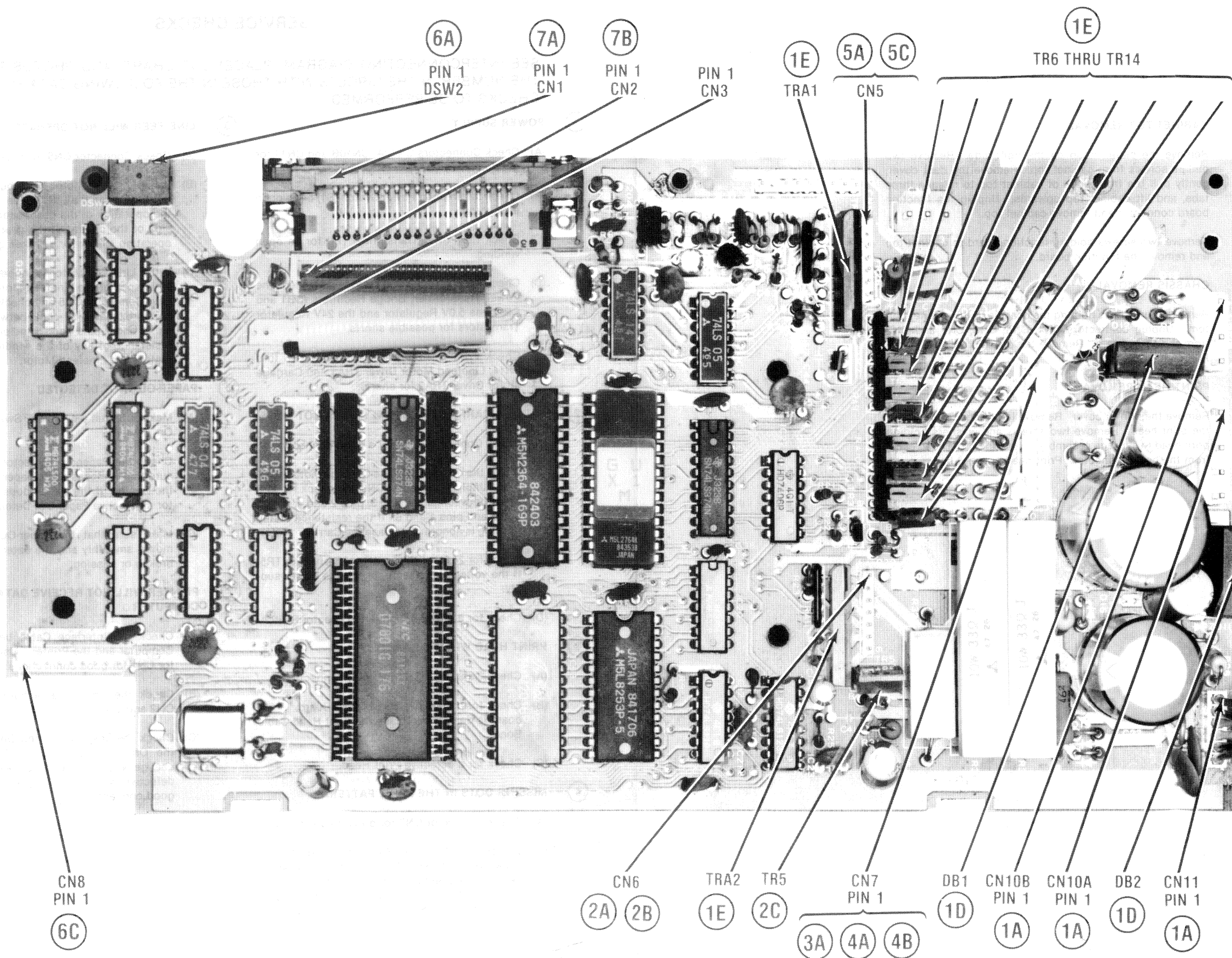
- (A) Make sure that pin 1 of DIP Switch (DSW2) is set On.
- (B) Check the Paper-Out Detector Switch to make sure that it closes when paper is removed from the Printer. If the switch does not close, check for a defective Paper-Out Detector Switch.
- (C) Make sure that the Paper-Out detector lever moves smoothly and the detector spring is not broken or missing.

⑦

PRINTER WILL NOT RECEIVE DATA FROM HOST COMPUTER

- (A) Check the Interface Cable between the host Computer and the Printer. Also check Connector CN1 for good connections.
- (B) Check the ribbon cable between Connectors CN2 and CN3.
- (C) Check the operation of the On-Line Switch. If the On-Line status of the Printer does not change when the switch is pressed, check for a defective switch. Also check Connector CN8 for good connections.

PRELIMINARY SERVICE CHECKS (Continued)



PRELIMINARY SERVICE CHECKS (Continued)

MISCELLANEOUS ADJUSTMENTS

PRINT HEAD TO PLATEN ADJUSTMENT

Place the Platen Adjust Lever at the second step position (handle straight up). Insert a feeler gauge between the ribbon guide and the platen. The gap should measure between 0.25mm and 0.35mm. Check the gap with the print head at the left, center and right of platen for uniformity.

If the platen gap is out of tolerance, the following adjustment is required.

Move the Platen Adjust Lever all the way forward (lock in bottom notch). Fasten the left and right adjust bushes with two (M3 x 6) screws into the frame tap holes. Remove nut and lock washer holding adjust lever. If the gap is too wide place the adjust lever on point A or B. See Figure 1. If gap is too narrow place the adjust lever on point C or D. See Figure 1. Retighten nut on adjust lever and remove the two retaining screws from frame tap holes. Check gap measurement.

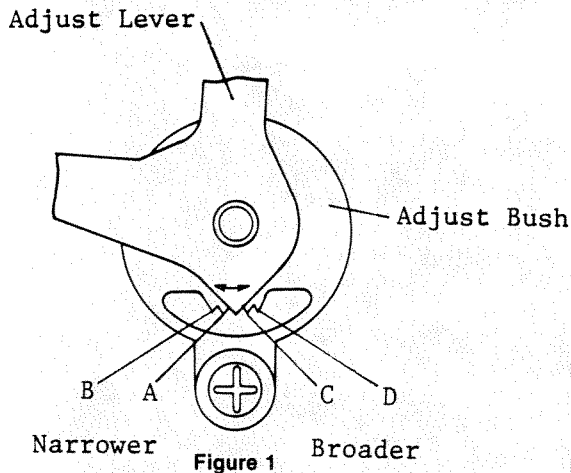


Figure 1

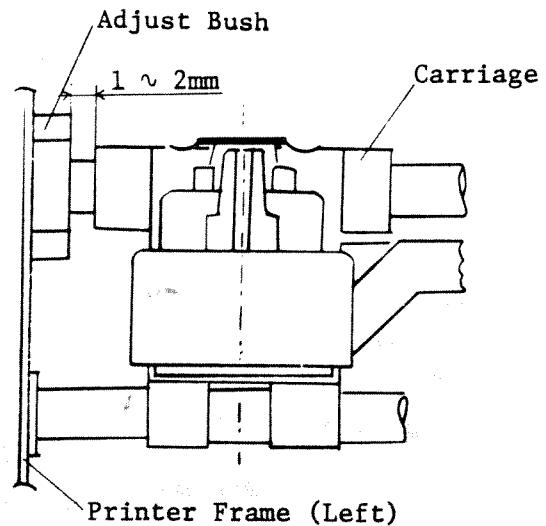


Figure 2

RIGHT END DETECTOR ADJUSTMENT

If the right end detector switch is not closing when the carriage assembly is moved to the far right, adjustment is required. Remove the ink ribbon spools. Remove two pins holding ribbon base plate and remove plate. Slide carriage assembly to far right. Loosen screw in slotted hole of detector switch. Pivot switch until it just closes and tighten screw.

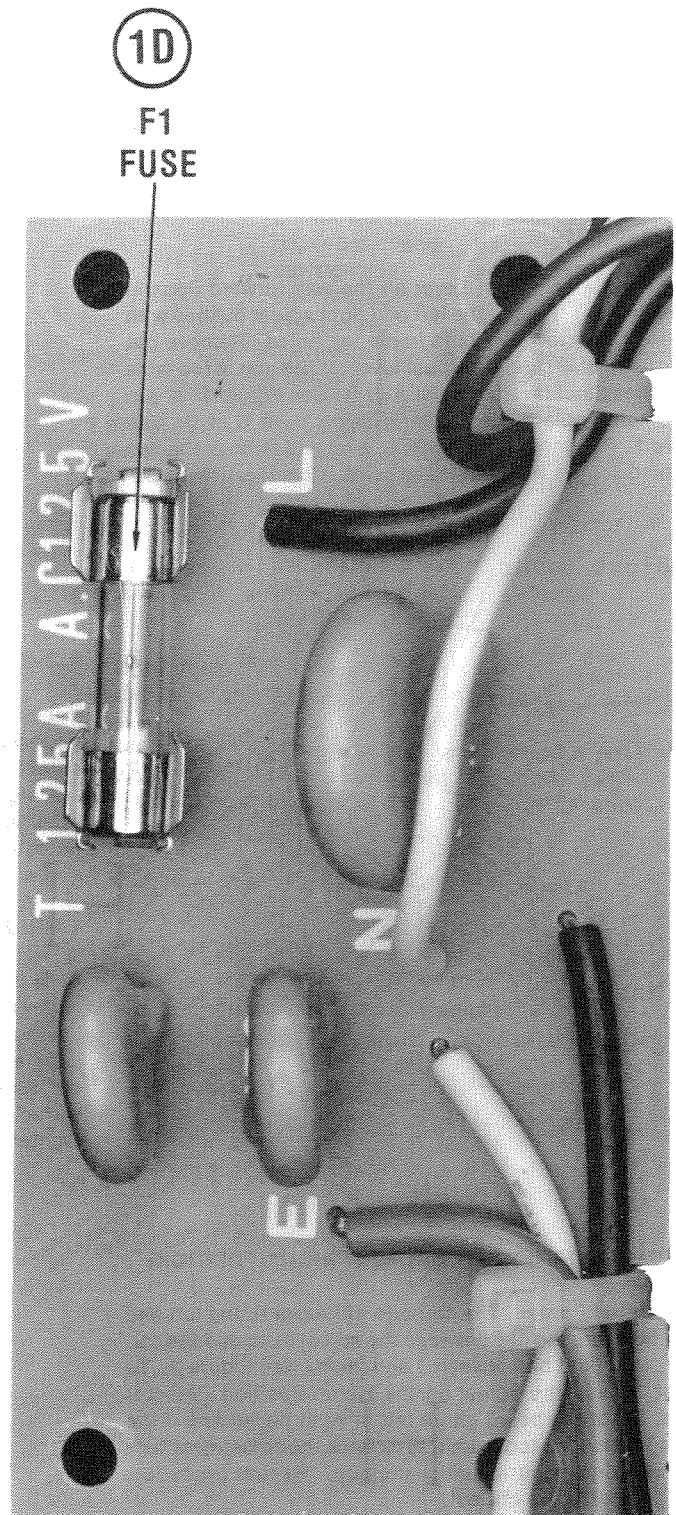
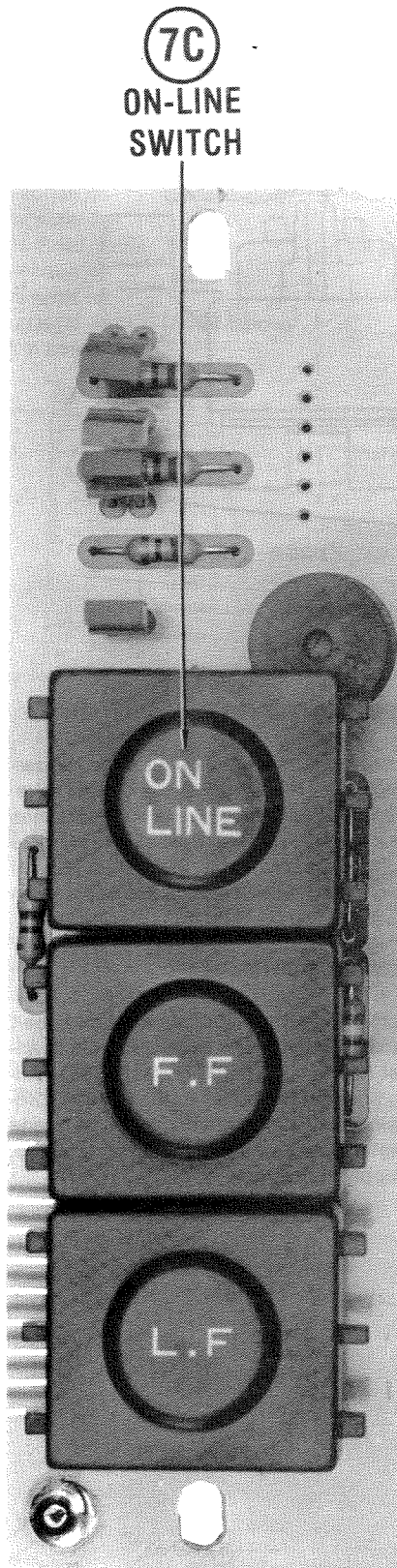
TIMING BELT TENSION ADJUSTMENT

Slide carriage assembly to far right. Locate left timing belt pulley adjusting plate. Loosen screw in slotted hole of adjusting plate. Adjust belt tension for 30 grams $\pm$ 10%. Adjustment is made by pushing the pulley to the left until proper tension is obtained. If adjustment cannot be made within tolerance replacement of timing belt is required. Tighten screw and apply screw lock.

CARRIAGE POSITION ADJUSTMENT (HOME POSITION)

Turn ON the Printer. The carriage will move to the left and stop. Measure the gap between the adjust bush and the carriage. It should be between 1 and 2mm. See Figure 2. To adjust, loosen the screw on the Home Position Detector board. Pivot the board either left or right depending if the gap is too wide or too narrow. To check the adjustment turn ON the Printer and measure the gap. Repeat procedure until gap setting is correct.

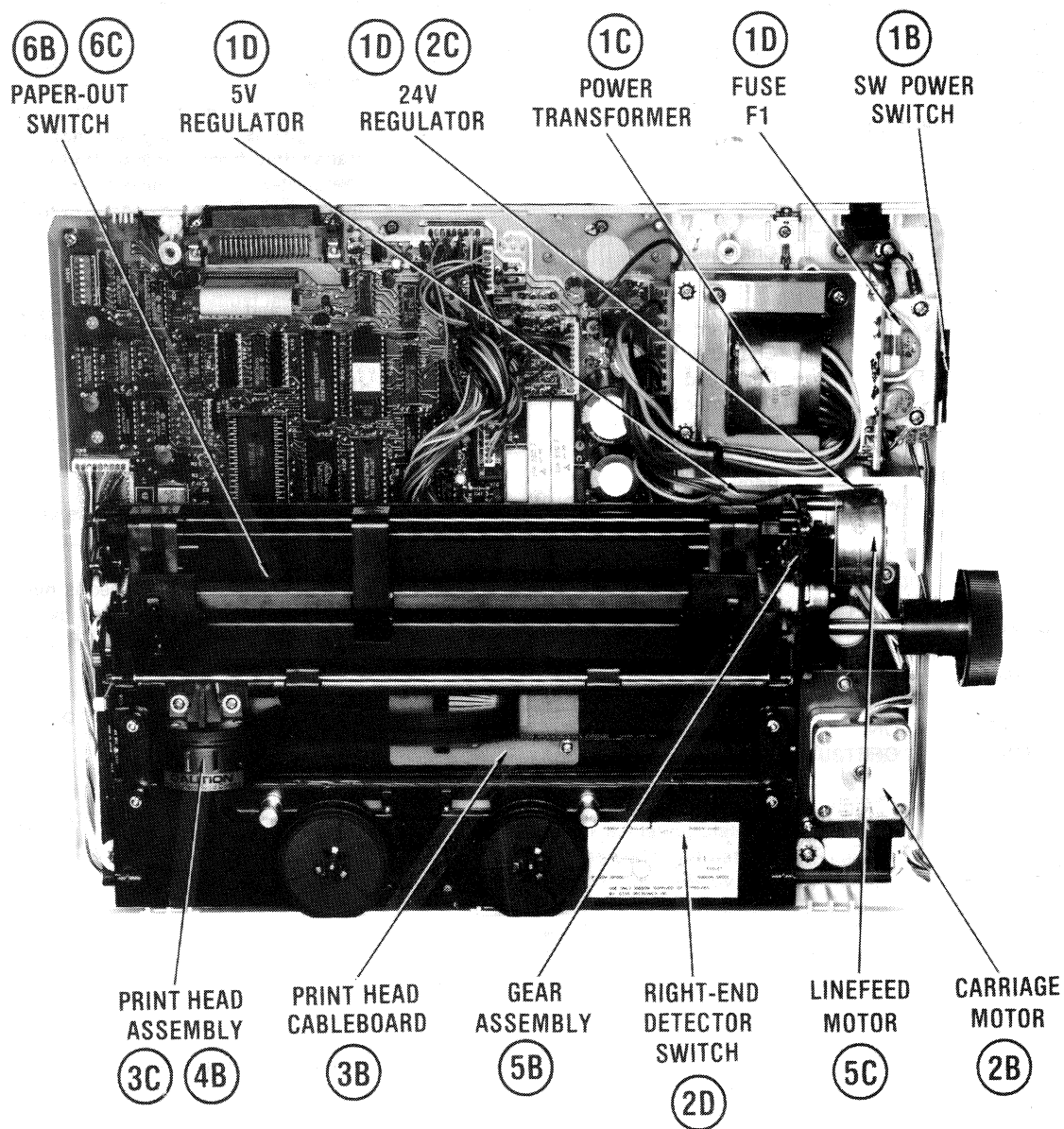
PRELIMINARY SERVICE CHECKS (Continued)



CONTROL PANEL BOARD

FUSE BOARD

PRELIMINARY SERVICE CHECKS (Continued)



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CHASSIS-TOP VIEW

DIP SWITCH SETTINGS

DSW1

FUNCTIONS	DSW1 ON	DSW1 OFF
1-1 Selection of Character Set	(Refer below)	
1-2 Print Mode at Power ON	Normal	Emphasized
1-3 Set of Print Pitch	10 CPI	17 CPI
1-4 Selection of Character Set	(Refer below)	
1-5 Line Feed Value	1/6 inch	1/8 inch
1-6 Selection of		
1-7 International		
1-8 Character Set Form Length	(Refer below)	

DSW1

Pin No.	Pin No.	Character Set
1-1	1-4	
ON	ON	Standard ASCII Character Set
ON	OFF	Download Character Set
OFF	ON	Italic ASCII Character Set
OFF	OFF	Italic ASCII Character Set

DSW1

INTERNATIONAL CHARACTER SET DESIGNATION

	DSW1-6	DSW1-7	DSW1-8
U.S.A.	ON	ON	ON
England	OFF	ON	ON
Germany	ON	OFF	ON

Denmark	OFF	OFF	ON
France	ON	ON	OFF
Sweden	OFF	ON	OFF
Italy	ON	OFF	OFF
Spain	OFF	OFF	OFF

DSW2

FUNCTIONS	ON	OFF
2-1 Paper-Out	Disables the printer when paper-out. Paper-out signal is transmitted from the printer mechanism to the computer.	Allows the printer to print with no paper. Paper-out signal is not transmitted from the printer mechanism to the computer.
2-2 Buffer-Full Printing	CR code is ignored, and print data of one line is stored in the buffer until the memory is full or by input of a LF code.	Printing is performed every time CR code is input.
2-3 7/8 Bit Interface Selection	Interface is set to 7 bits.	Interface is set to 8 bits.
2-4 Automatic Line Feed	Automatic line feed is performed by input of CR code.	Line feed is not performed by input of CR code.

(Note) DIP switch pin No. 2-2 overrides DIP switch pin No. 2-4.

DISASSEMBLY INSTRUCTIONS

CABINET TOP REMOVAL

Remove the platen knob on the right side. Remove two philips screws from cabinet top. Remove the dust cover, gently pull the front edge of cabinet top to release three tabs, and lift cabinet top upwards. Unplug the function board connector and remove cabinet top.

Remove two screws holding function board to cabinet top and remove the function board.

CHASSIS REMOVAL

Remove four screws holding the chassis to the cabinet bottom. Unplug connectors CN4, CN5, CN6, CN7 and CN8 from the Main board. Remove the chassis assembly from Printer.

PRINT HEAD REMOVAL

Remove the printer cover. Remove ink ribbon from front of the print head. Remove two screws and washers holding print head to carriage assembly. Disconnect the head cable from the head connector. Print head may not be removed.

PRELIMINARY SERVICE CHECKS (Continued)

PREVENTATIVE MAINTENANCE

ENVIRONMENT

Computers perform best in a clean, cool area that is below 80 degrees Fahrenheit and free of dust and smoke particles. Even though home Computers are not affected by cigarette smoke as much as commercial Computers are affected, it is better to maintain a smoke-free area around the Computer. Do not block cabinet vents of any of the Computer system; Computer, Monitor, Printer, or other power devices.

ELECTRICAL POWER

Variations in the line voltage can affect the Computer. Try to avoid these fluctuations by using an AC receptacle that is on a power line not used by appliances or other heavy current demand devices. A power-surge protector, power-line conditioner, or non-interruptable power supply may be needed to cure the problem. **Do not** switch power On and Off frequently.

KEYBOARD

Liquids spilled into the Keyboard can ruin it. Immediately after a spill occurs, disconnect the Computer power plug from AC power outlet. Then, if circuitry or contacts are contaminated, disassemble the Keyboard and carefully rinse the Keyboard printed circuit board with distilled water and let it dry. Use a cotton swab to clean between the keys. Use a non-abrasive contact cleaner and lint-free wipers on accessible connectors and contacts.

DISK DRIVES

Clean the read/write heads of the Disk Drives about once a month or after 100 hours usage. Use only an approved head cleaning kit.

Handle carefully to preserve proper disk head alignment. A sudden bump or jolt to the Disk Drives can knock the disk head out of alignment. If the disk drive must be transported, place an old disk in slot and close door during transport.

Store disks in their protective covers and never touch the disk surface. Observe the disk handling precautions usually found on the back of disk protective covers.

PRINTERS

Carefully vacuum the Printer regularly. Wipe surface areas clean using a light all-purpose cleaner. Do not oil the machine. The oil will collect abrasive grit and dust. The dust will act as a blanket. This can cause components to overheat and fail.

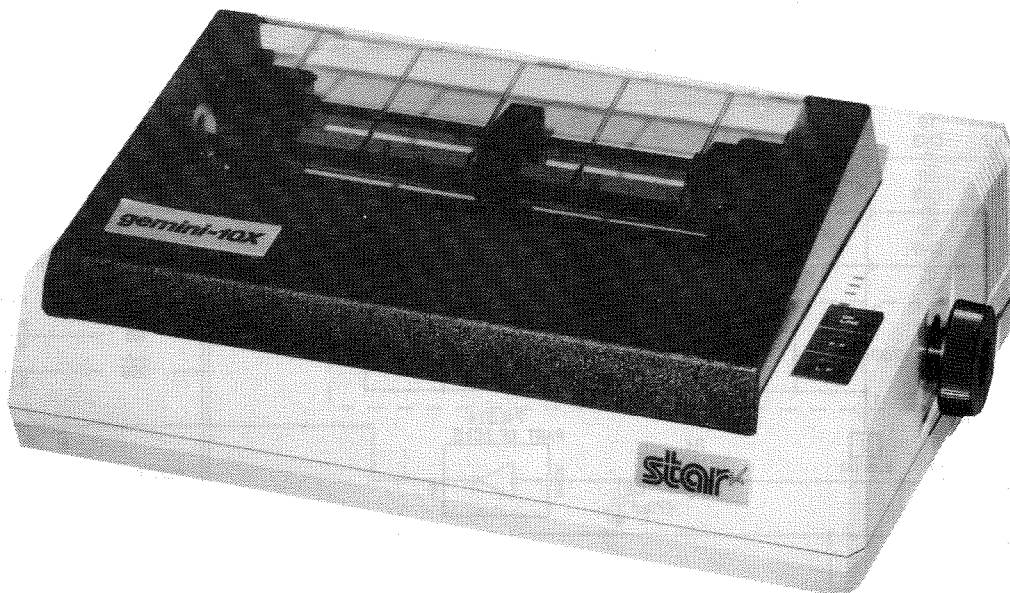
STATIC ELECTRICITY

Static electricity discharge can affect the Computer. In order to minimize the possibility, use anti-static mats, sprays, tools and materials, and maintain good humidity in the Computer environment.

MONITOR

Use an isolation transformer with any Monitor that does not come as part of the system since some Monitors use a HOT chassis (chassis connected to one side of the AC line). The face of the Monitor should never be left on for long periods of time at high brightness level except when pattern is being changed periodically. Use caution when cleaning anti-glare screens, to preserve the glare-reduction feature.

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PRELIMINARY SERVICE CHECKS

ENCLOSED

SAFETY PRECAUTIONS

See page 10.

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Star Micronics Printers are warranted for one year from date of purchase. If any service or modifications are performed during this time by other than Authorized Star Micronics Service Centers, the manufacturers' warranty will be void.

SAMS™ Howard W. Sams & Co., Inc.

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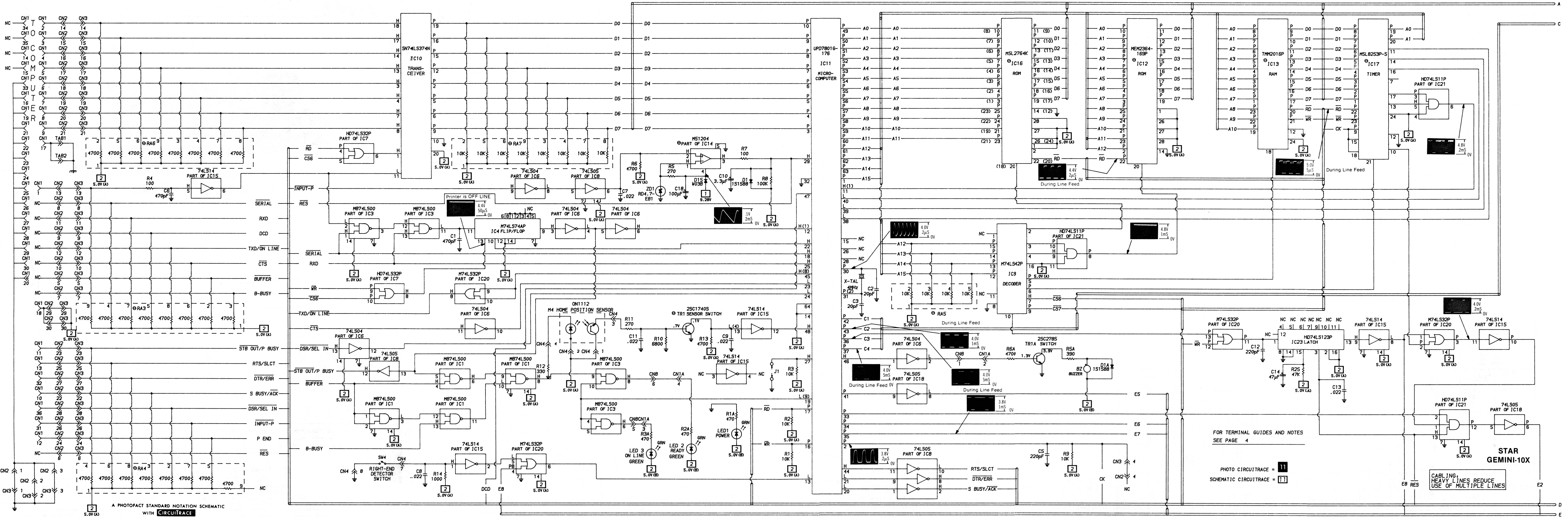
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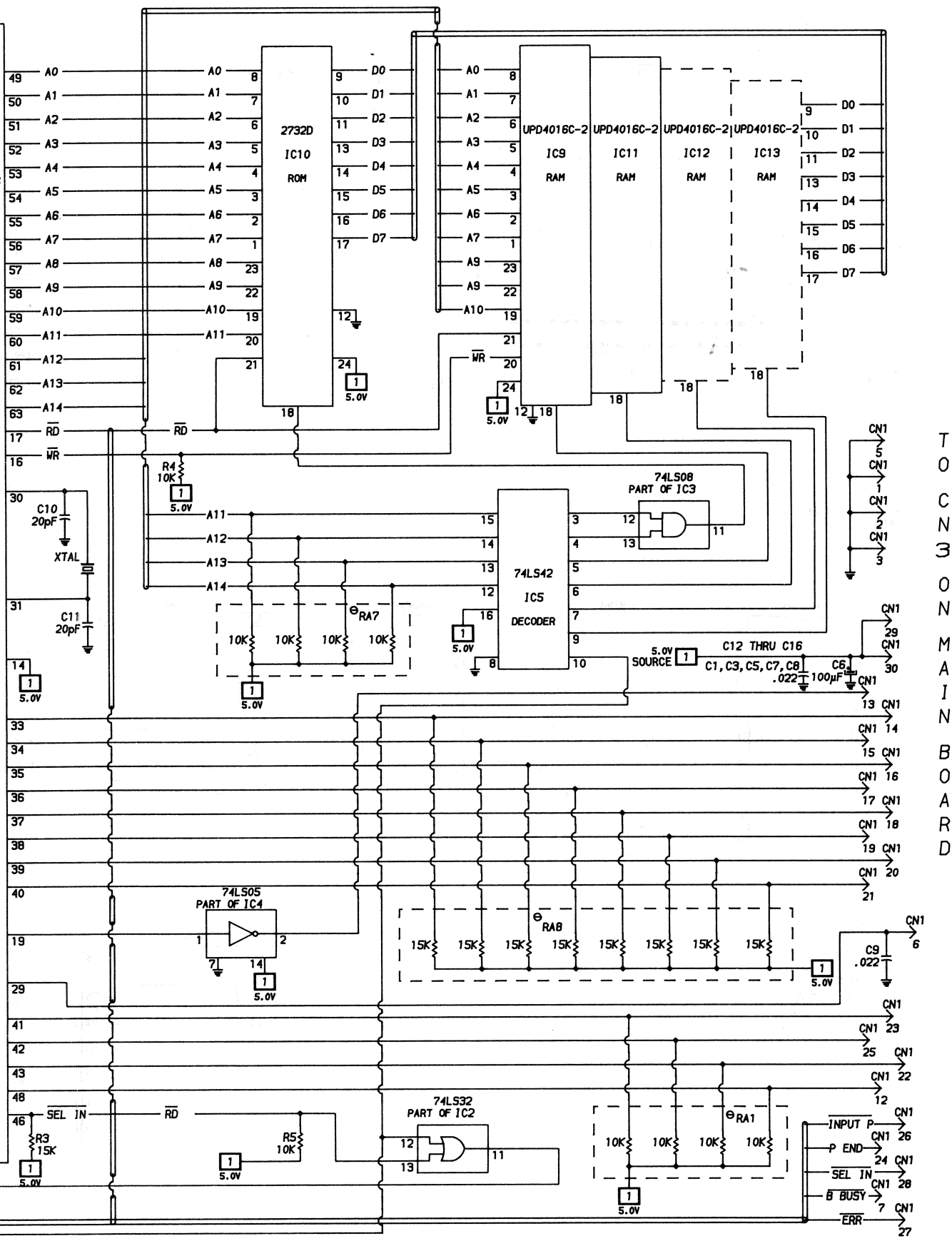
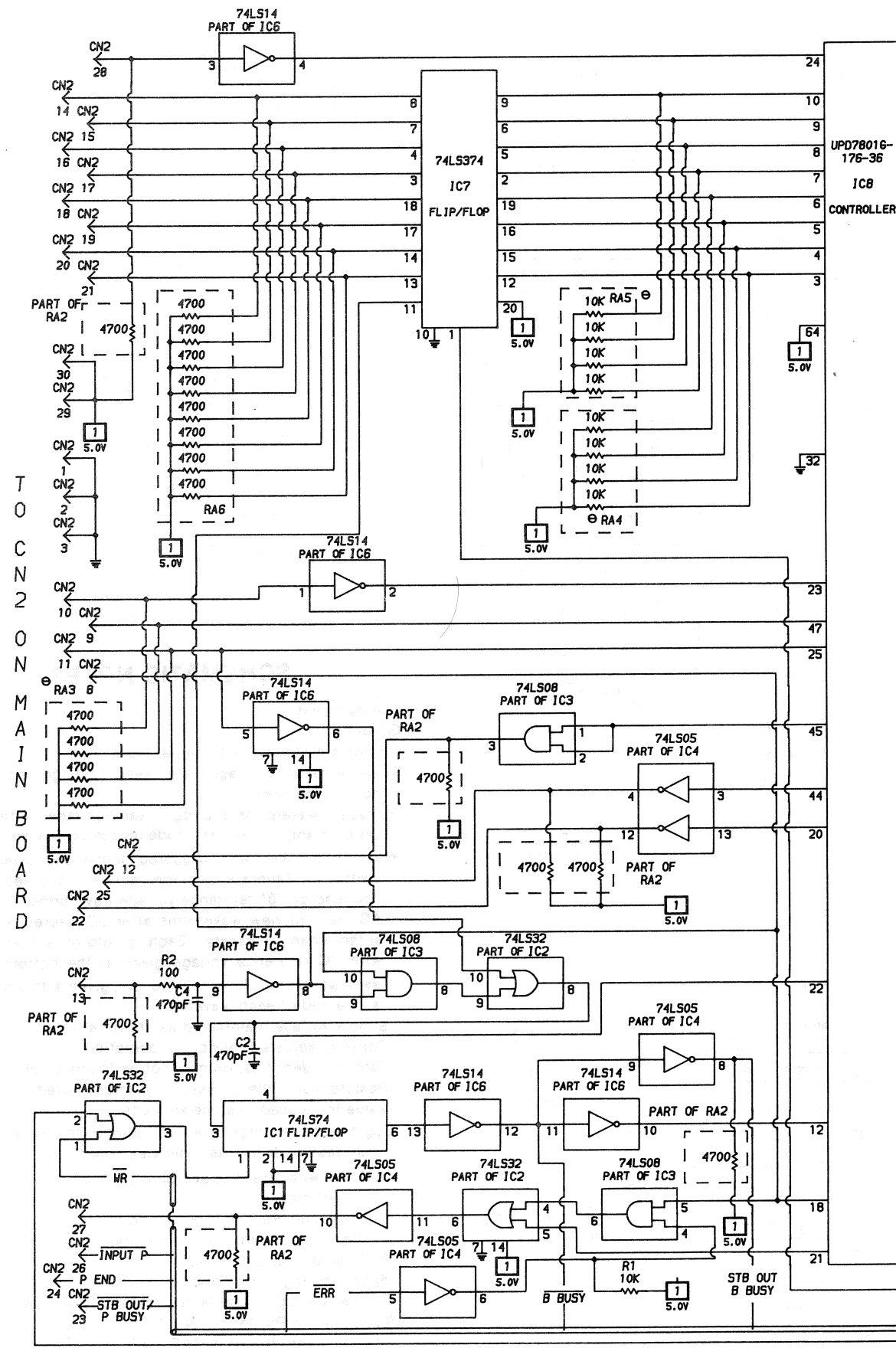
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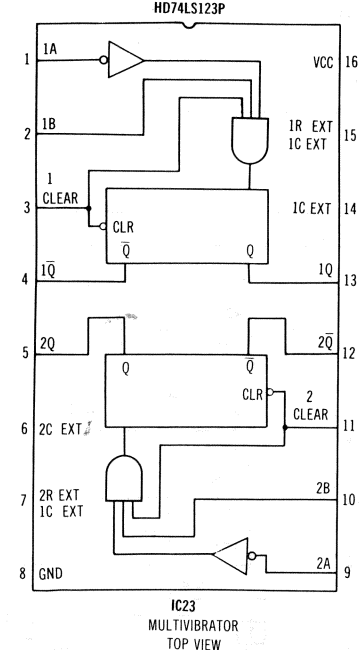
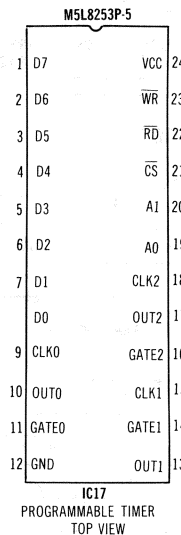
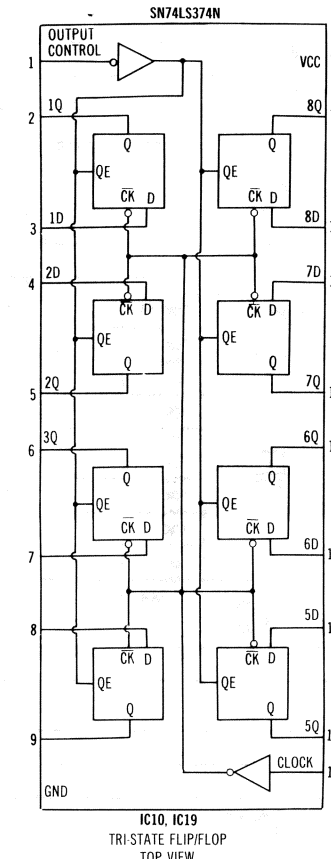
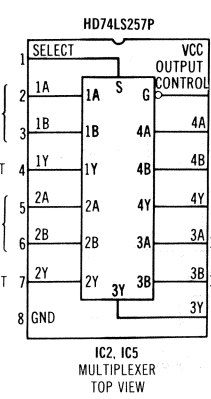
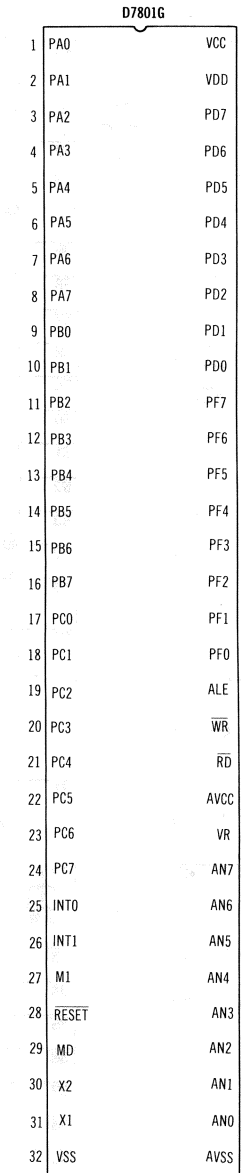
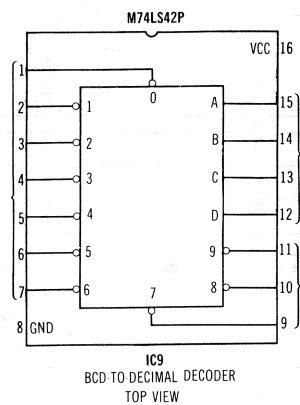
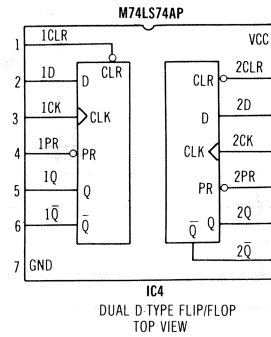
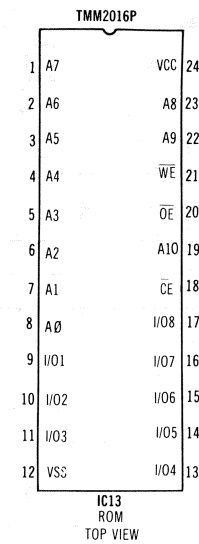
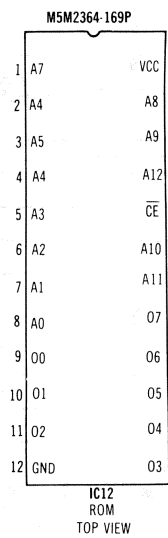
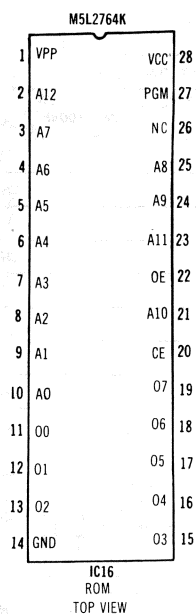
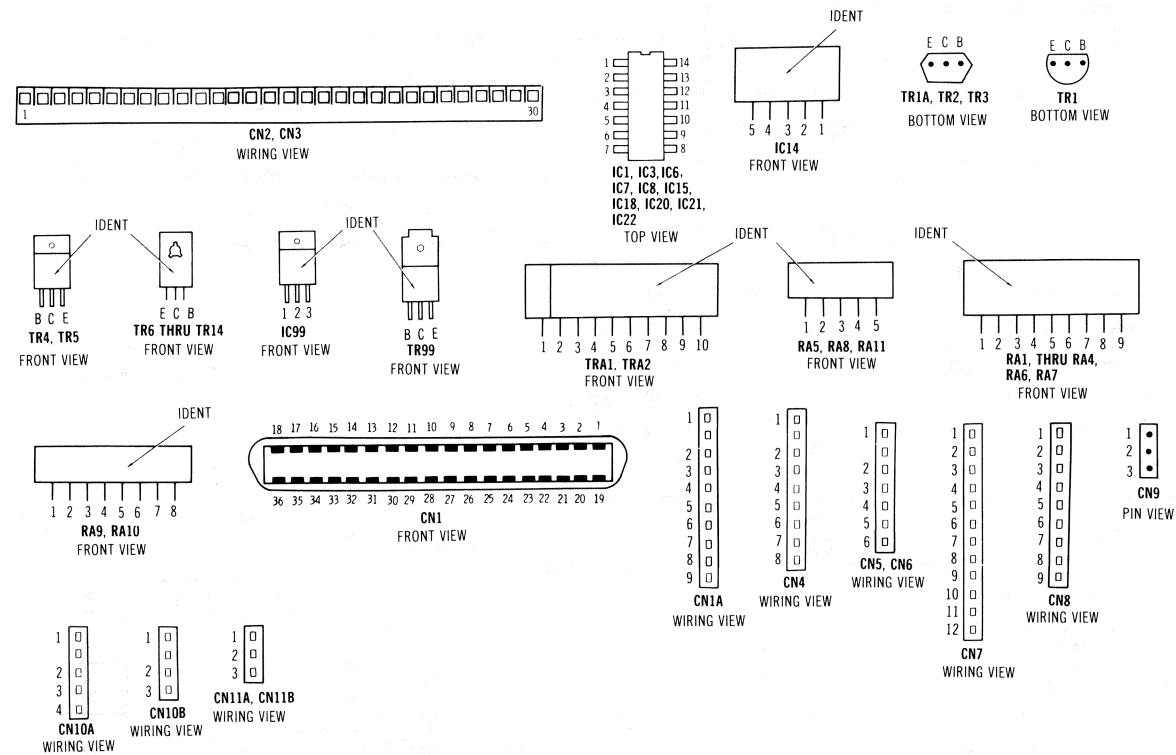
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INPUT BUFFER

OPTIONAL INPUT BUFFER SCHEMATIC

INPUT BUFFER

IC PINOUTS & TERMINAL GUIDES

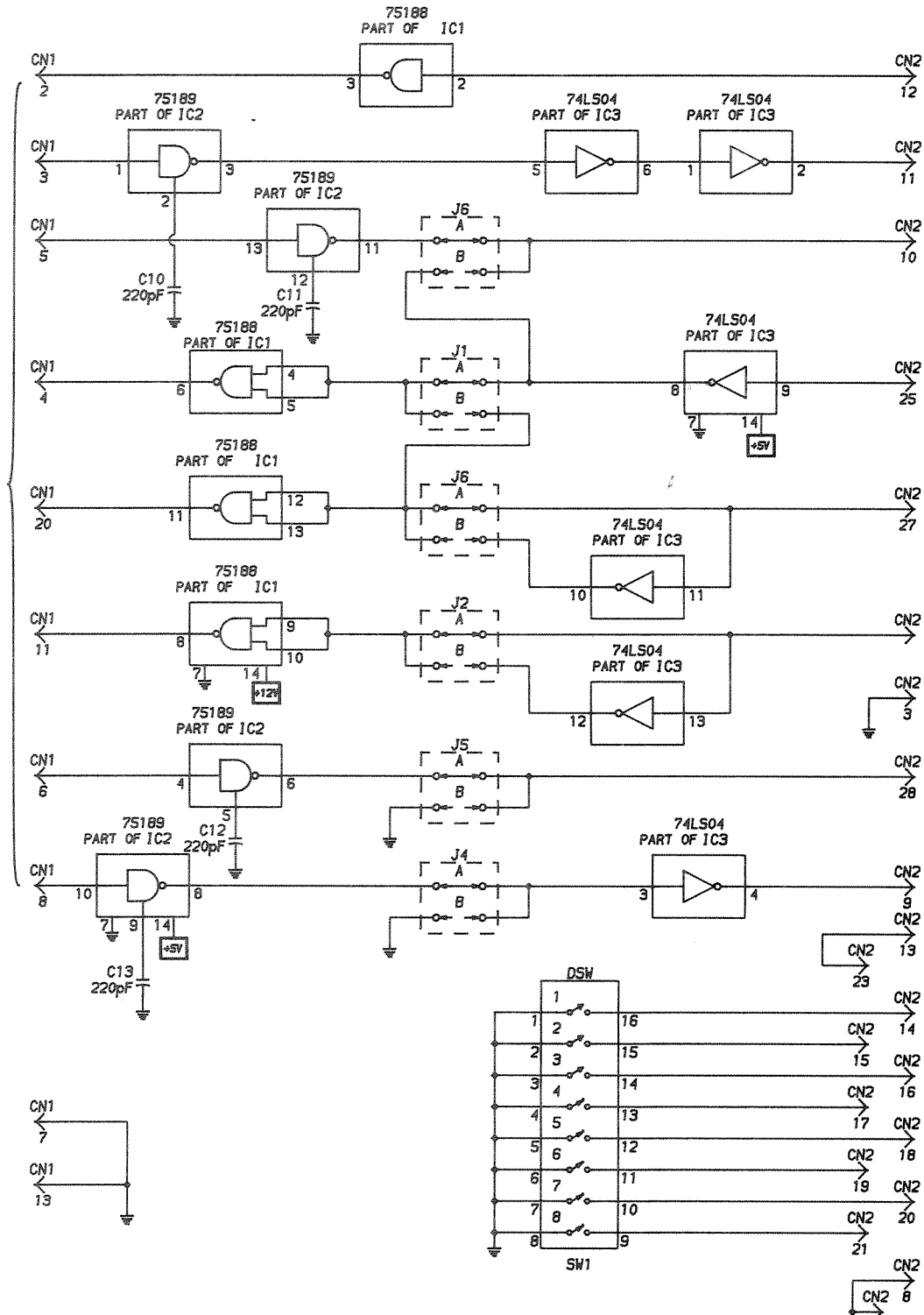


SCHEMATIC NOTES

- See parts list
 - ★ Ground
- Voltages measured with digital meter.
Waveforms and voltages are taken from ground, unless noted otherwise.
- Voltages, waveforms and logic readings taken with printer On Line and in self-test mode unless otherwise noted.
- Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on "0" reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 7.5cm width with DC reference voltage given at the bottom line of each waveform. Time in μ s per cm, given with p-p reading at the end of each waveform.
- Supply voltage maintained as shown at input.
Controls adjusted for normal operation.
Terminal identification may not be found on unit.
Resistors are $\frac{1}{2}$ W or less, 5% unless noted.
Value in () used in some versions.
- Logic probe readings taken with printer On Line and in self-test mode unless otherwise noted.
- (1) Pulse when Head is at Home position.
 - (2) Do not measure.
 - (3) Low when Head is at Home position.
 - (4) High when Head is at Home position.
 - (5) Pulse during Line Feed.
 - (6) Low during Form Feed.
 - (7) Low when Carriage Motor changes direction.
 - (8) Low when Printer is ON LINE.
 - (9) High when Printer is OFF LINE.

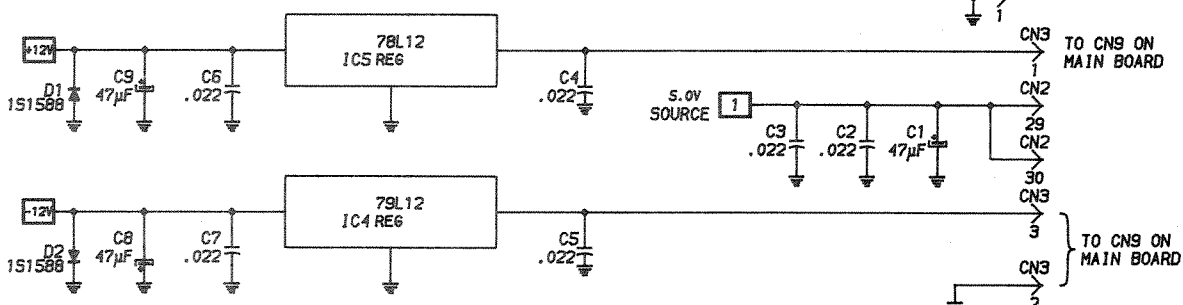
TO COMPUTER

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TO CN3
ON MAIN BOARD
WITHOUT
INPUT BUFFER

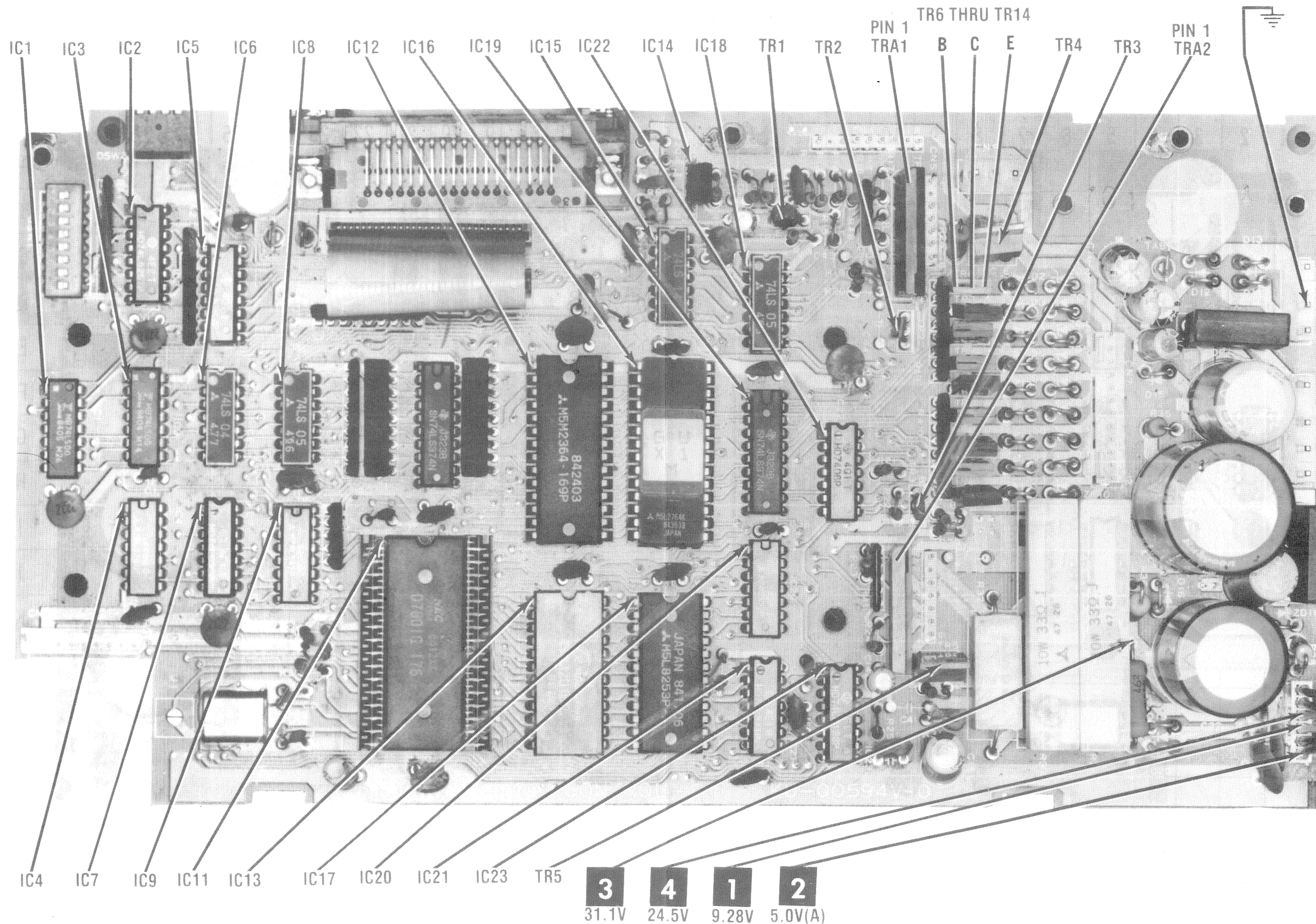
TO CN2
ON INPUT
BUFFER BOARD
IF USED



OPTIONAL SERIAL INTERFACE SCHEMATIC

MAIN BOARD GridTrace LOCATION GUIDE

C1	H-4	DB1	E-27	RA10	G-21
C2	M-7	DB2	J-29	RA11	J-19
C3	N-7	DSW1	C-2	TR1	C-17
C4	O-8	DSW2	A-4	TR2	E-20
C5	I-9	IC1	G-2	TR3	I-20
C6	D-13	IC2	C-4	TR4	C-22
C7	B-15	IC3	G-4	TR5	L-21
C8	C-14	IC4	J-4	TR6	D-21
C9	C-16	IC5	D-5	TR7	E-21
C10	C-16	IC6	G-5	TR8	E-21
C11	B-18	IC7	J-5	TR9	F-21
C12	L-18	IC8	G-7	TR10	F-21
C13	M-18	IC9	J-7	TR11	G-21
C14	L-19	IC10	G-10	TR12	H-21
C15	N-21	IC11	K-10	TR13	H-21
C16	D-25	IC12	G-13	TR14	I-21
C17	E-25	IC13	L-13	TRA1	C-20
C18	E-26	IC14	B-15	TRA2	K-20
C19	G-28	IC15	D-15	X-TAL	M-6
C20	I-27	IC16	G-15	ZD1	B-14
C21	J-28	IC17	L-15	ZD2	D-24
C22	L-27	IC18	D-17	ZD3	E-24
C23	N-28	IC19	G-17	ZD4	E-24
C24	N-28	IC20	J-17	ZD5	F-24
C25	I-2	IC21	M-17	ZD6	F-24
C26	E-4	IC22	H-19	ZD7	G-24
C27	K-3	IC23	M-19	ZD8	G-24
C28	C-5	R1	L-7	ZD9	H-24
C29	K-5	R2	L-7	ZD10	H-24
C30	H-7	R3	L-7	ZD11	K-28
C31	I-10	R4	E-13		
C32	O-10	R5	A-14		
C33	E-13	R6	C-14		
C34	J-13	R7	B-16		
C35	F-15	R8	B-17		
C36	J-15	R9	M-16		
C37	F-17	R10	B-17		
C38	I-17	R11	B-18		
C39	O-17	R12	B-18		
C40	N-20	R13	C-17		
C45	F-19	R14	B-18		
CN1	B-10	R15	C-18		
CN2	C-9	R16	B-19		
CN3	E-9	R17	B-19		
CN4	A-19	R18	C-19		
CN5	C-20	R19	D-19		
CN6	K-21	R20	D-19		
CN7	G-24	R21	H-19		
CN8	L-2	R22	I-20		
CN9	B-22	R23	J-19		
CN10A	G-29	R24	L-19		
CN10B	D-29	R25	N-19		
CN11A	M-29	R26	C-21		
CN11B	N-29	R27	C-22		
D1	B-16	R28	I-21		
D2	D-22	R29	I-21		
D3	E-22	R30	M-21		
D4	E-22	R31	M-21		
D5	F-22	R32	L-22		
D6	F-22	R33	K-23		
D7	G-22	R34	K-24		
D8	G-22	R35	G-25		
D9	H-22	R36	K-25		
D10	H-22	R37	M-25		
D11	D-27	R38	L-29		
D12	D-27	RA1	C-3		
D13	D-27	RA2	D-4		
D14	D-27	RA3	E-8		
D15	F-26	RA4	G-8		
D16	K-25	RA5	J-8		
D17	L-28	RA6	G-9		
D18	M-28	RA7	G-11		
D19	M-26	RA8	C-19		
D20	N-26	RA9	E-21		

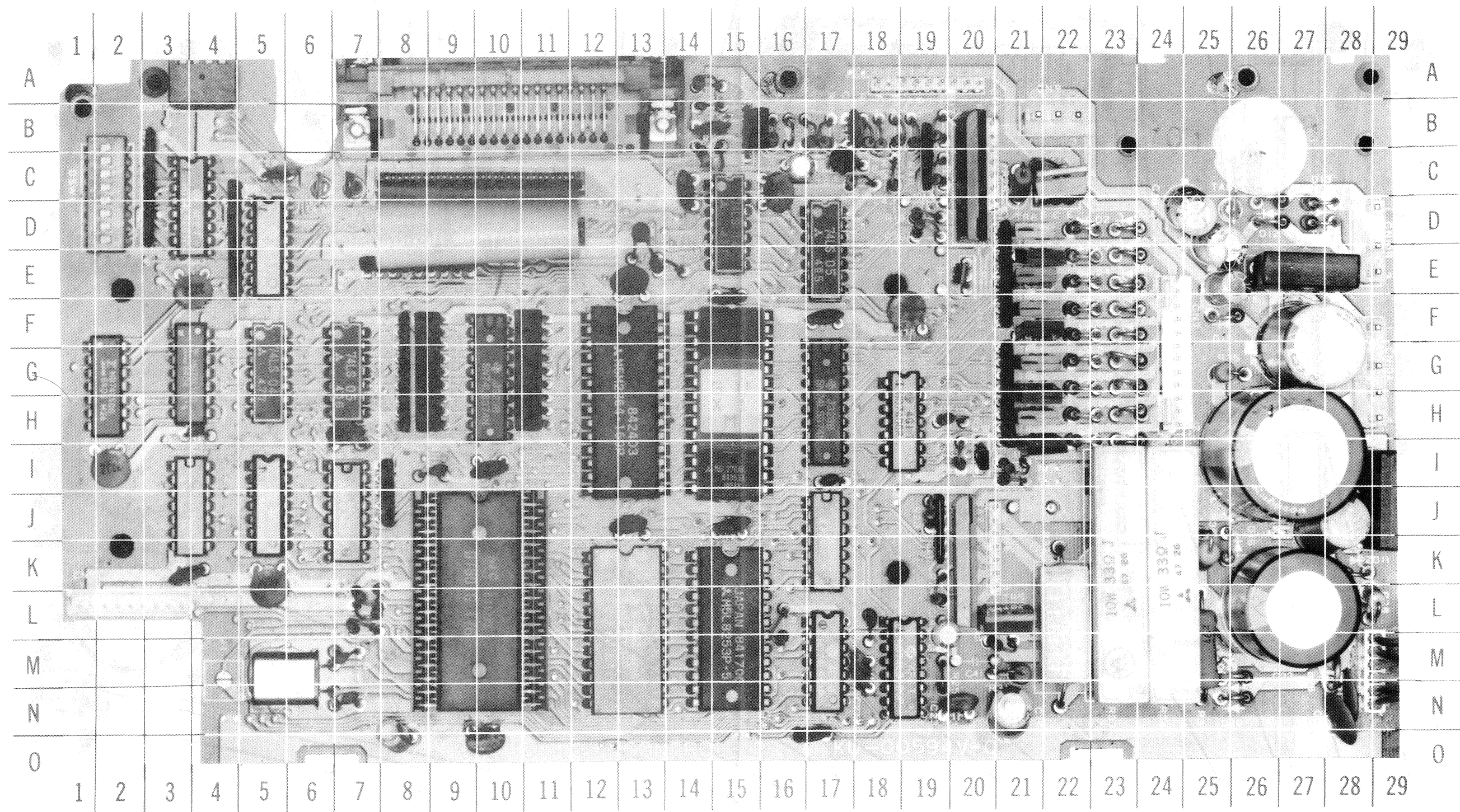


ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED

MAIN BOARD

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MAIN BOARD



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GEMINI-10X

DISASSEMBLY INSTRUCTIONS

CABINET TOP REMOVAL

Remove the platen knob on the right side. Remove two philips screws from cabinet top. Remove the dust cover, gently pull the front edge of cabinet top to release three tabs, and lift cabinet top upwards. Unplug the function board connector and remove cabinet top.

Remove two screws holding function board to cabinet top and remove the function board.

CHASSIS REMOVAL

Remove four screws holding the chassis to the cabinet bottom. Unplug connectors CN4, CN5, CN6, CN7 and CN8 from the Main board. Remove the chassis assembly from Printer.

PRINT HEAD REMOVAL

Remove the printer cover. Remove ink ribbon from front of the print head. Remove two screws and washers holding print head to carriage assembly. Disconnect the head cable from the head connector. Print head may not be removed.

LINE DEFINITIONS

A0 THRU A15	Address Lines
B BUSY	Bus Busy
BUFFER	Buffer
C1, C2	Carriage Motor Driving Pulses
C3, C4	Line Feed Motor Driving Pulses
CS6, CS7	Chip Select
CTS	Clear to Send
D0 THRU D7	Data Lines
DCD	Data Carrier Detection
DSR/SEL IN	Data Set Ready/Select In
DTR/ERR	Data Terminal Ready/Error
E2, E5 THRU E8	Enable
INPUT P	Input Prime
P END	Paper End
RD	Read
RES	Reset
RTS/SLCT	Request to Send/Select
RXD	Received Data
S BUSY/ACK	Busy/Acknowledge
SERIAL	Serial
STB OUT/P BUSY	Strobe Out/Printer Busy
TXD/ON LINE	Transmitting Data/On Line
WR	Write

Any Bar above any alphabetical or numerical combination indicates Line active in a Low (0) state.

SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the printer before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.
5. Use a grounded-tip, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install board, mechanical or electrical parts, or other peripherals with printer AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. This printer is equipped with a grounded three-pronged AC plug. This plug must fit into a grounded AC power outlet. Do not defeat the AC plug safety feature.
10. Periodically examine the AC power cord for damaged or cracked insulation.
11. The printer cabinet is equipped with vents to prevent heat build-up. Never block, cover, or obstruct these vents.
12. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
13. Never expose the printer to water. If exposed to water turn the unit Off. Do not place the printer near possible water sources.
14. Never leave the printer unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.
15. Do not allow anything to rest on AC power cord.
16. Unplug AC power cord from outlet before cleaning printer.
17. Never use liquids or aerosols directly on the printer. Spray on cloth and then apply to the printer cabinet. Make sure the printer is disconnected from the AC power line.

DIP SWITCH SETTINGS

DSW1

			Denmark	OFF	OFF	ON
			France	ON	ON	OFF
			Sweden	OFF	ON	OFF
			Italy	ON	OFF	OFF
			Spain	OFF	OFF	OFF
FUNCTIONS	DSW1 ON	DSW1 OFF				

1-1 Selection of Character Set	(Refer below)	
1-2 Print Mode at Power ON	Normal	Emphasized
1-3 Set of Print Pitch	10 CPI	17 CPI
1-4 Selection of Character Set	(Refer below)	
1-5 Line Feed Value	1/6 inch	1/8 inch
1-6 Selection of International		
1-8 Character Set Form Length	(Refer below)	

DSW2

FUNCTIONS	ON	OFF
2-1 Paper-Out	Disables the printer when paper-out. Paper-out signal is transmitted from the printer mechanism to the computer.	Allows the printer to print with no paper. Paper-out signal is not transmitted from the printer mechanism to the computer.
2-2 Buffer-Full Printing	CR code is ignored, and print data of one line is stored in the buffer until the memory is full or by input of a LF code.	Printing is performed every time CR code is input.
2-3 7/8 Bit Interface Selection	Interface is set to 7 bits.	Interface is set to 8 bits.
2-4 Automatic Line Feed	Automatic line feed is performed by input of CR code.	Line feed is not performed by input of CR code.

DSW1

Pin No.	Pin No.	Character Set
1-1	1-4	
ON	ON	Standard ASCII Character Set
ON	OFF	Download Character Set
OFF	ON	Italic ASCII Character Set
OFF	OFF	Italic ASCII Character Set

DSW1

INTERNATIONAL CHARACTER SET DESIGNATION

	DSW1-6	DSW1-7	DSW1-8
U.S.A.	ON	ON	ON
England	OFF	ON	ON
Germany	ON	OFF	ON

(Note) DIP switch pin No. 2-2 overrides DIP switch pin No. 2-4.

TEST EQUIPMENT

Test Equipment listed by Manufacturer illustrates typical or equivalent equipment used by SAMS' Engineers to obtain measurements and is compatible with most types used by field service technicians.

Equipment Name	B & K Precision Equipment No.	Sencore Equipment No.	Simpson Equipment No.
OSCILLOSCOPE	1570A,1590A,1596	SC61	454
LOGIC PROBE	DP51		
LOGIC PULSER	DP101		
DIGITAL VOM	2830	DVM37,DVM56,SC61	463,467,470,474,467E
ANALOG VOM	277		260-7,160,165, 260-6XL,260-7P, 260-6XLP
ISOLATION TRANSFORMER	TR110,1604,1653,1655	PR57	
FREQUENCY COUNTER	1803,1805	FC71,SC61	710
COLOR BAR GENERATOR	1211A,1248,1251,1260	CG25,VA62	431
RGB GENERATOR	1260		
FUNCTION GENERATOR	3020		420A,420D
HI-VOLTAGE PROBE VOM/DMM Accessory probes	HV-44	HP200	248 00168,00411,00749
TEMPERATURE PROBE	TP-28		IR-10,00760,00758; 383,389,388
CRT ANALYZER	467,470	CR70	

TROUBLESHOOTING

POWER SUPPLY

Apply 120VAC power to the Printer and turn On the Power Switch (S1). If Power indicator is Off and the Printer is dead, check for 120VAC across the primary winding of the Power Transformer. If the 120VAC is missing, check AC Fuse (F1), Power Switch (S1) and the power cord. If the 120VAC is present, check for 8.3VAC between pins 1 and 2 of Connector CN10A and check for 25VAC between pins 3 and 4 of Connector CN10A. Also check for 14.3VAC between pins 1 and 3 of Connector CN10B. If any of the AC voltages are missing, check the Power Transformer (T1).

If the AC voltages are present on the secondary windings of the Power Transformer, check for 9.28V at the output of Bridge Rectifier (DB1). If the 9.28V is missing, check DB1. If 9.28V is present at the output of DB1, check for 5.0V at pin 6 of Connector CN11. If the 5.0V is missing at pin 6 of CN11, check Regulator (IC99).

Check for 31V at the output of Bridge Rectifier (DB2). If the 31V is missing, check DB2. If 31V is present at the output of DB2, check for 24.5V at pin 3 of Connector CN11A. If the 24.5V is missing at pin 3 of CN11A, check the 24V Regulator Transistor (TR99).

If AC Fuse (F1) is blown, turn the Printer Off and remove all Connectors on the Main Board. Replace Fuse F1 and turn the Printer On. If the fuse blows again, check for a shorted Capacitor on the AC Power Supply board. Also check the Power Transformer for shorted turns. If the fuse is not blown, turn the Printer Off and reconnect Connectors CN10A and CN10B. Turn the Printer On again and check to see if the fuse is blown. If the fuse is blown, check for a short in the DC Power Supply on the Main Board. If the fuse is not blown, turn Off the Printer and reconnect Connector CN11. Turn the Printer On and check Fuse F1. If the fuse is blown, check the 5.0V Regulator (IC99) and the 24V Regulator Transistor (TR99).

If Fuse F1 is not blown after CN11 has been connected, turn the Printer Off and reconnect Connector CN8. Turn the Printer On again and check the fuse. If the fuse is blown, check for a short on the Control Panel Board. If the fuse is not blown, turn the Printer Off and remove the Print Head cable from the Head Cable Board on the Printer Mechanism. Reconnect Connector CN7, turn the Printer On and check Fuse F1. If the fuse is blown, check for a short on the Head Cable Board. If the fuse is not blown, turn the Printer Off and reconnect the Print Head cable. Turn the Printer On again and check the fuse. If the fuse is blown, replace the Print Head.

If the fuse is not blown turn the Printer Off and reconnect Connector CN6. Turn the Printer On again and check the fuse. If the fuse is blown, replace the Carriage Motor (M1). If the fuse is not blown, turn the Printer Off and reconnect Connector CN5. Turn the Printer On again and check the fuse. If the fuse is blown, replace the Line Feed Motor (M2). If the fuse is not blown, turn the Printer Off and reconnect Connector CN4. Turn the Printer On and check the fuse. If the fuse is blown, check the Home Position Detector Board.

SELF-TEST

Press the Power Switch (S1) and the L.F. Switch (SW3) at the same time. The Printer should go into a self-test mode that will print four lines showing the standard character set of the Printer. If the L.F. button is held down, the self-test printout will continue. If the self-test does not function properly, check Connector CN8 for a good connection. Also check the L.F. Switch (SW3) on the Control Panel Board. Make sure that the Paper Out Indicator (LED4) is Off and the Paper Out Switch (SW5) is operating. If the L.F. Switch is normal and the Paper Out circuit is functioning properly, check the Microcomputer (IC11) and the ROMs (IC12 and IC16).

TROUBLESHOOTING (Continued)

LINEFEED MOTOR MALFUNCTIONING

If the Linefeed Motor (M2) turns but the paper does not feed, check the gear assembly on the right side of the Printer. If the Linefeed Motor is inoperative, check for approximately 9.4V at pin 4 of Connector CN11B and 24.5V at pin 3 of CN11A. If either voltage is missing, refer to the "Power Supply" section of this Troubleshooting guide. If the voltages are normal at pins 3 and 4 of CN11, check the resistance of the Linefeed Motor windings. Disconnect Connector CN5 and check for 51 ohms between pins 2 and 3, pins 2 and 4, pins 1 and 5 and pins 1 and 6. If the resistance of any Linefeed Motor winding is abnormal, replace the motor.

If the Linefeed Motor windings are normal, reconnect Connector CN5 and check for linefeed drive signals at pins 36 and 37 of the Microcomputer (IC11). If either of the linefeed drive signals are missing at pins 36 or 37 of IC11, check IC11 by substitution. If the linefeed drive signals are present at pins 36 and 37 of IC11, check IC18 and the Linefeed Driver (TRA1).

MICROCOMPUTER OPERATION

Check for 5.0V at pin 64 of the Microcomputer (IC11). If the 5.0V is missing, refer to the "Power Supply" section of this Troubleshooting guide.

Check for the 2MHz clock signal at pin 2 of the IC11. If the 2MHz clock signal is missing at pin 2 of IC11, check the Crystal (X-TAL) and Capacitors C2 and C3. Also check IC11 by substitution.

PRINT HEAD

The Print Head (M3) is moving back and forth but is not printing or some dots are missing. Check for approximately 31V at pin 6 of Connector CN7. If the 31V is missing, refer to the "Power Supply" section of this Troubleshooting guide. If the 31V is present at pin 6 of CN7, check for pulses at the collectors of Driver Transistors TR6 thru TR14. If pulses are present at the collectors of TR6 thru TR14, check the Print Head by substitution. Also check the Head Cable Board and Connector CN7. If the pulses are missing at any of the collectors of Driver Transistors TR6 thru TR14, check for pulses at the base of the Transistor with the missing collector pulses. If pulses are present at the base, check the Transistor. Also check the Diode and the Zener Diode in the collector circuit of the affected Transistor. If the pulses are missing at the base of the Transistor, check Flip/Flop (IC19) and Resistor Network (RA9 or RA10).

If the pulses are missing on all of the collectors of Driver Transistors TR6 thru TR14, check for pulses at pin 1 of IC19. If the pulses are present at pin 1 of IC19, check IC19. If the pulses are missing at pin 1 of IC19, check for pulses at pin 10 of IC15. If the pulses are present at pin 10 of IC15, check IC11, IC18 and IC21. If the pulses are missing at pin 10 of IC15, check IC15, IC17 and IC20.

CARRIAGE ASSEMBLY DOES NOT MOVE

Check for approximately 24.5V at the emitter of Switch Transistor (TR5). If the 24.5V is missing at the emitter of TR5, refer to the "Power Supply" section of this Troubleshooting guide. If the 24.5V is present at the emitter of TR5, check the voltage at the collector of TR5 while the Printer is in the self-test mode. The TR5 collector voltage should be approximately 23.5V when the Print Head is moving back and forth. If the 23.5V is missing at the Collector of TR5, check for pulses at the base of TR5 while in the self-test mode. If the pulses are present at the base of TR5, check Transistor TR5. If the pulses are missing at the base of TR5, check the Microcomputer (IC11), IC22 and Resistor R31.

If 23.5V is present at the collector of TR5 while in the self-test mode, check for the Carriage Motor drive signal at pins 3, 4, 5 and 6 of Connector CN6. If the drive signal is missing, check IC22 and the Carriage Motor Driver (TRA2). If the Carriage Motor drive signals are present at Connector CN6, check the Carriage Motor winding resistances. Unplug Connector CN6 and check for 11.3 ohms between pins 2 and 3, pins 2 and 4, pins 1 and 5 and pins 1 and 6. If the resistance of any winding is abnormal, replace the Carriage Motor (M1).

PRINTER WILL NOT PRINT IN ON-LINE MODE

Confirm that the On-Line Switch (SW1) changes the status of the Printer. The On-Line and Ready LEDs should turn On and Off when the On-Line Switch is pressed. If the On-Line Switch does not operate, check the switch and Connector CN8. If the On-Line Switch works normally, check the Interface Cable between the Printer and the host Computer. Also check Connector CN1 and the ribbon cable between Connectors CN2 and CN3. If the cables and connectors are good, check for a logic Low on pin 12 of IC8. If pin 12 of IC8 is not Low, check IC3, IC4, IC6, IC7 and IC8.

If pin 12 of IC8 is Low, check for a logic Low ACK pulse at pin 2 of IC8 while attempting to receive data. If the ACK pulse is not present at pin 2 of IC8, check IC8. If the ACK pulse is present at pin 2 of IC8, check for a logic Low STROBE pulse at pin 13 of Connector CN3. If the STROBE pulse is present at pin 13 of Connector CN3, check the Microcomputer (IC11) and the ROMs (IC12 and IC16).

PRINTER DOES NOT DETECT PAPER-OUT

Make sure that pin 1 of DIP Switch (DSW2) is set On. Check the Paper-Out Detector Switch (SW5) to confirm that it closes when the paper is removed from the Printer. If the switch does not close, check for a defective switch. Also make sure that the Paper-Out detector lever moves smoothly and the detector spring is not broken or missing. If the Paper-Out Switch is functioning, check Switch (DSW2) and Selector (IC5).

MISCELLANEOUS ADJUSTMENTS

PRINT HEAD TO PLATEN ADJUSTMENT

Place the Platen Adjust Lever at the second step position (handle straight up). Insert a feeler gauge between the ribbon guide and the platen. The gap should measure between 0.25mm and 0.35mm. Check the gap with the print head at the left, center and right of platen for uniformity.

If the platen gap is out of tolerance, the following adjustment is required.

Move the Platen Adjust Lever all the way forward (lock in bottom notch). Fasten the left and right adjust bushes with two (M3×6) screws into the frame tap holes. Remove nut and lock washer holding adjust lever. If the gap is too wide place the adjust lever on point A or B. See Figure 1. If gap is too narrow place the adjust lever on point C or D. See Figure 1. Retighten nut on adjust lever and remove the two retaining screws from frame tap holes. Check gap measurement.

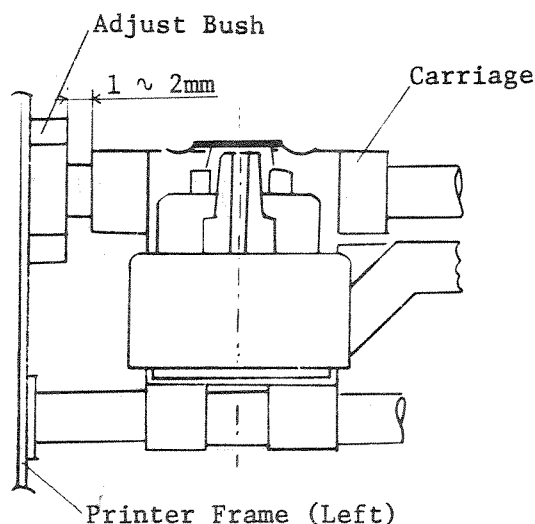
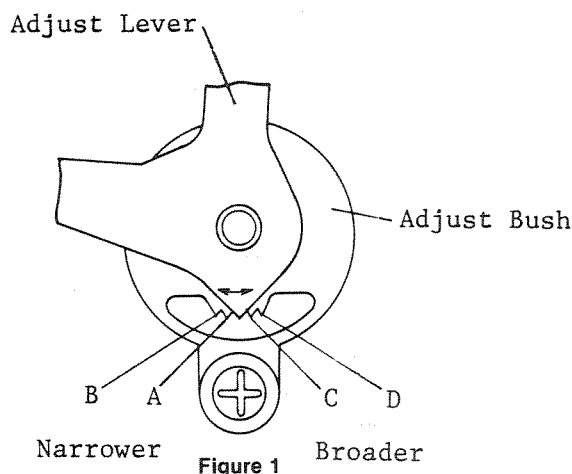


Figure 2

RIGHT END DETECTOR ADJUSTMENT

If the right end detector switch is not closing when the carriage assembly is moved to the far right, adjustment is required. Remove the ink ribbon spools. Remove two pins holding ribbon base plate and remove plate. Slide carriage assembly to far right. Loosen screw in slotted hole of detector switch. Pivot switch until it just closes and tighten screw.

TIMING BELT TENSION ADJUSTMENT

Slide carriage assembly to far right. Locate left timing belt pulley adjusting plate. Loosen screw in slotted hole of adjusting plate. Adjust belt tension for 30 grams $\pm$ 10%. Adjustment is made by pushing the pulley to the left until proper tension is obtained. If adjustment cannot be made within tolerance replacement of timing belt is required. Tighten screw and apply screw lock.

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CARRIAGE POSITION ADJUSTMENT (HOME POSITION)

Turn ON the Printer. The carriage will move to the left and stop. Measure the gap between the adjust bush and the carriage. It should be between 1 and 2mm. See Figure 2. To adjust, loosen the screw on the Home Position Detector board. Pivot the board either left or right depending if the gap is too wide or too narrow. To check the adjustment turn ON the Printer and measure the gap. Repeat procedure until gap setting is correct.

PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
D1, 1A D2 thru D17 D18 D19, 20 DB1, 2 IC1 IC2 IC3 IC4 IC5 IC6 IC7 IC8 IC9 IC10 IC11 IC12 IC13 IC14 IC15 IC16 IC17 IC18	MAIN BOARD	08000001 08020025 08000017 08020025 08990202 08210001 08210040 08210001 08210033 08210040 08210002 08210053 08210017 08210004 08210052 08220048 08220033 08220027 08200040 08210023 08220014 08220028 08210017	GE-514 GE-504A	NTE519 NTE116	ECG519 ECG116	SK3100/519 SK3311	WEP925/519 WEP156	103-131 212-76-02
			GE-512 GE-504A GE-167 74LS00	NTE5809 NTE116 NTE167 NTE74LS00	ECG5809 ECG116 ECG167 ECG74LS00	SK9010/5809 SK3311 SK3647/167 SK74LS00	WEP4008/5809 WEP156 WEP1052/167	212-Z9000 212-76-02 212-Z9001 HE-443-728
			74LS257 74LS00 74LS74A 74LS257 74LS04	NTE74LS257 NTE74LS00 NTE74LS74A NTE74LS257 NTE74LS04	ECG74LS257 ECG74LS00 ECG74LS74A ECG74LS257 ECG74LS04	SK74LS257 SK74LS00 SK74LS74A SK74LS257 SK74LS04		HE-443-802 HE-443-728 HE-443-730 HE-443-802 HE-443-755
			74LS32 74LS05 74LS42 74LS374	NTE74LS32 NTE74LS05 NTE74LS42 NTE74LS374	ECG74LS32 ECG74LS05 ECG74LS42 ECG74LS374	SK74LS32 SK74LS05 SK74LS42		HE-443-875 HE-443-818 HE-443-807 HE-443-863
			74LS14	NTE74LS14	ECG74LS14	SK74LS14		HE-443-872
			74LS05	NTE74LS05	ECG74LS05	SK74LS05		HE-443-818

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
IC19	SN74LS374N	08210052	74LS374	NTE74LS374	ECG74LS374			HE-443-863
IC20	M74LS32P	08210053	74LS32	NTE74LS32	ECG74LS32	SK74LS32		HE-443-875
IC21	HD74LS11P	08210058	74LS11	NTE74LS11	ECG74LS11	SK74LS11		HE-443-864
IC22	HD7406P	08210006	GE-7406	NTE7406	ECG7406	SK7406		HE-443-698
IC23	HD74LS123P	08210059	74LS123	NTE74LS123	ECG74LS123	SK74LS123		HE-443-942
IC99	7805		GE IC-190	NTE960	ECG960	SK3591/960		221-Z9043
M4	7805A	08200043	GE IC-190	NTE960	ECG960	SK3591/960		221-Z9043
TR1	ON1112	87045030(11)						
	25C1740S		GE-62	NTE85	ECG85	SK3122	WEP736/123A*	121-Z9065
	25C2785	07227851	GE-210	NTE85	ECG85	SK3124A/289A	WEP910/289	921-1114
TR1A	25C2785							
TR2,3	25A1175	07227851	GE-210	NTE85	ECG85	SK3124A/289A	WEP910/289	921-1114
TR4,5	25B707	07011751	GE-269	NTE290A	ECG290A	SK3114A/290A	WEP911/290A	121-Z9003*
TR6 thru	25D986K	07107071	GE-250	NTE197	ECG197	SK3083/197	WEP757/197	121-988-03
TR14		07309861				SK9370		921-1309
TR99	25D1277B							
TRA1	STA401A	07312771	GE-345	NTE261	ECG261	SK3896/261	WEP261/261	121-Z9085
TRA2	PU4124	07650003						
ZD1	RD4.7EB1	07650003						
		08020030	GEZD-4.7	NTE5009A	ECG5009A	SK4A7/5009A	WEP1409/5009	103-279-09
ZD2 thru	B197							
ZD10	RD20FB2	08020020	GEZD-20	NTE5079A	ECG5079A	SK20V/5079A	WEP1163/5079	103-Z9023
ZD11	CZ255	08020022	GEZD-25	NTE5082A	ECG5082A	SK25V/5082A	WEP1165/5082	103-251
INPUT BUFFER								
IC1	74LS74	08210033	74LS74A	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
IC2	74LS32	08210053	74LS32	NTE74LS32	ECG74LS32	SK74LS32		HE-443-875
IC3	74LS08	08210032	74LS08	NTE74LS08	ECG74LS08	SK74LS08		HE-443-780
IC4	74LS05	08210017	74LS05	NTE74LS05	ECG74LS05	SK74LS05		HE-443-818
IC5	74LS42	08210004	74LS42	NTE74LS42	ECG74LS42	SK74LS42		HE-443-807
IC6	74LS14	08210023	74LS14	NTE74LS14	ECG74LS14	SK74LS14		HE-443-872

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFG. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
IC7 IC8	74LS374 uPD7801G-176-36	08210052 08220048	74LS374	NTE74LS374	ECG74LS374			HE-443-863
IC9 IC10 IC11 thru IC13	uPD4016C-2 2732D uPD4016C-2	08220027 08220014 08220027		NTE2128 NTE2128	ECG2128 ECG2128			
SERIAL INTERFACE BOARD								
D1,2 IC1 IC2 IC3 IC4 IC5	1S1588 75188 75189 74LS04 79L12 78L12	08000001 08210047 08210048 08210002 08200064 08200045	GE-514 74LS04	NTE519 NTE75188 NTE75189 NTE74LS04	ECG519 ECG75188 ECG75189 ECG74LS04	SK3100/519 SK5188/75188 SK5189/75189 SK74LS04	WEP925/519	103-131 HE-443-794 HE-443-795 HE-443-755

* Lead configuration may vary from original.
(1) Assembly, Includes P.C. Board.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

CAPACITORS

ITEM No.	RATING	MFGR. PART No.
C1A	.0047 125VAC	(1)
C2A	.0047 125VAC	(1)

ITEM No.	RATING	MFGR. PART No.
C3A	.01 125VAC	(1)

(1) Part of Power Supply Assembly STAR Part No. 87223010.

Items Not Listed Are Normally Available At Local Distributors.

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NTE PART No.	WORKMAN PART No.
R32	39 5% 5W WW	06993902	5W039	
R33	33 5% 10W WW	06993301	10W033	
R34	33 5% 10W WW	06993301	10W033	
RA1	Resistor Network (1)	06584723		
RA2	Resistor Network (1)	06584723		
RA3	Resistor Network (1)	06584723		
RA4	Resistor Network (1)	06584723		
RA5	Resistor Network (2)	06581031		
RA6	Resistor Network (1)	06584723		
RA7	Resistor Network (3)	06581032		
RA8	Resistor Network (4)	06542221		
RA9	Resistor Network (5)	06541521		
RA10	Resistor Network (5)	06541521		
RA11	Resistor Network (4)	06542221		
INPUT BUFFER				
RA1	Resistor Network (2)	06581031		
RA2	Resistor Network (1)	06584723		
RA3	Resistor Network (6)	06584721		
RA4	Resistor Network (2)	06581031		
RA5	Resistor Network (2)	06581031		
RA6	Resistor Network (1)	06584723		
RA7	Resistor Network (2)	06581031		
RA8	Resistor Network (7)	06581531		

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(1) Contains eight (8 ea.) 4700 10%.

(2) Contains four (4 ea.) 10K 10%.

(3) Contains eight (8 ea.) 10K 10%.

(4) Contains four (4 ea.) 2200.

(5) Contains four (4 ea.) 1500 10%.

(6) Contains four (4 ea.) 4700.

(7) Contains eight (8 ea.) 15K.

COILS & TRANSFORMERS (Sweep Circuits)

ITEM No.	FUNCTION	MFGR. PART No.	OTHER IDENTIFICATION	NOTES
T1	Power Transformer	(1)		

(1) Part of Power Supply Unit number 87223010

WIRING DATA

Shielded Hook-up Wire	Use BELDEN No. 8401 or 8421 (Single-Conductor) 8208 (Two-Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8529 (Solid) Available in 13 Colors 8522 (Stranded) Available in 13 Colors

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
F1	1.25A @ 125V Fast-Acting 1.25A @ 125V AC Slow-Blow 630mA @ 250V AC Slow-Blow Thermal Fuse	09990020 09990021 (1) (2)		

(1) Used in 220/240V Input versions.

(2) Part of Transformer T1.

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
BZ	Buzzer	45060201	
DSW1	DIP Switch	09090009	
DSW2	DIP Switch	09090008	
LED1	LED	08300027	Power On Indicator, Grn
LED2	LED	08300027	Ready Indicator, Grn
LED3	LED	08300027	On Line Indicator, Grn
LED4	LED	08300028	Paper Out Indicator, Red
M1	Motor	87041011	Carriage
M2	Motor	87041020	Line Feed
M3	Print Head	89070000	
M4	Home Position Sensor	87045030	
S1	Switch		Power
SW1	Switch	09010024	On Line
SW2	Switch	09010024	Form Feed
SW3	Switch	09010024	Line Feed
SW4	Switch		Right-End Detector
SW5	Switch		Paper Out
X-TAL	Crystal	09250010	4MHz
	PC Board	87222021	Main
	PC Board	87220320	Control Panel
	Power Supply Unit	87223010	

CABINETS & CABINET PARTS (When ordering specify model, chassis & color)

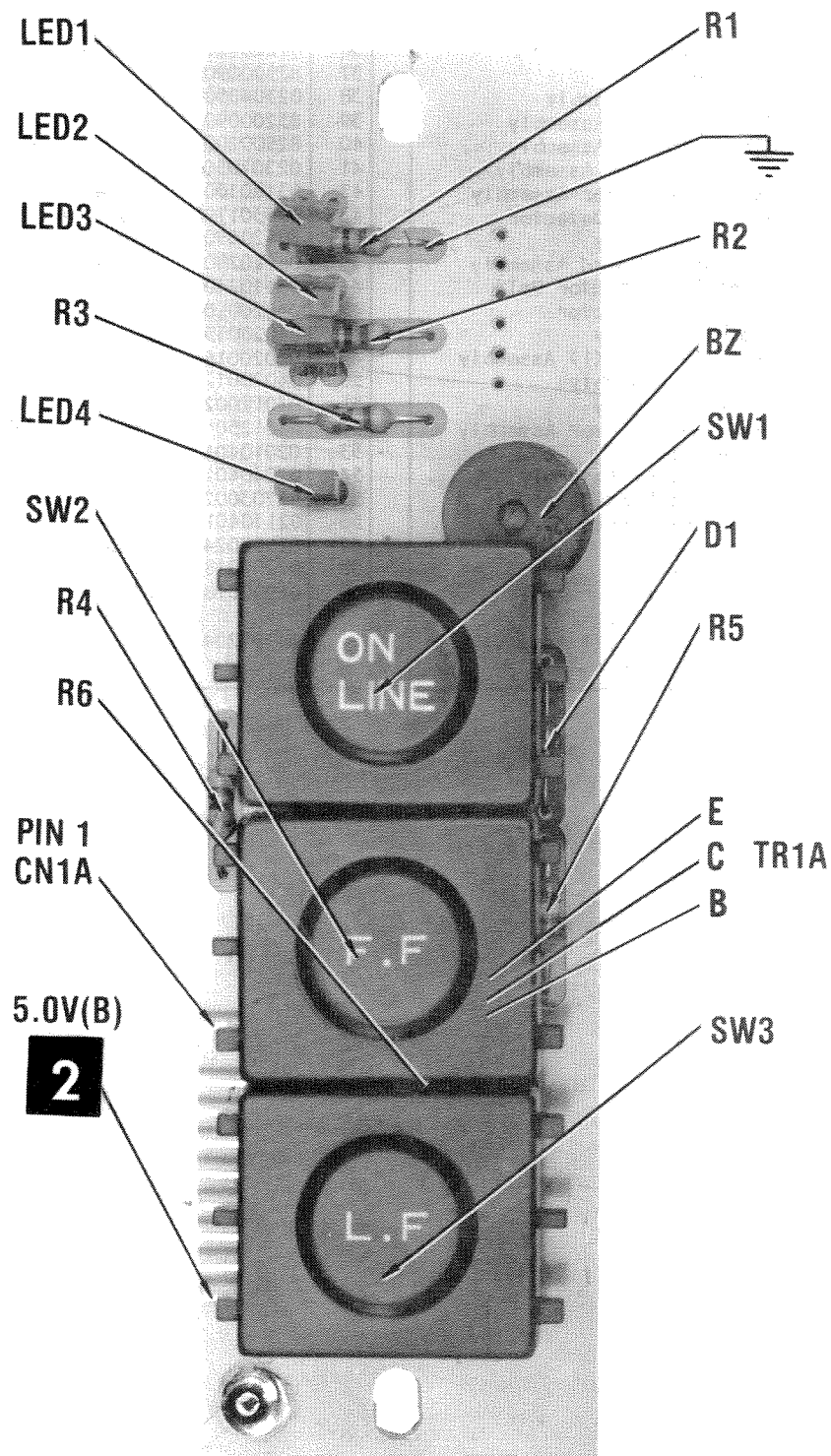
ITEM	PART No.	ITEM	PART No.
Cabinet Bottom	83020271	Paper Separator	80530120
Cabinet Top	83020260	Paper Guide	80530130
Printer Cover	87220430	Ink Ribbon	80900090
Platen Knob	87224010		

MECHANICAL PARTS LIST

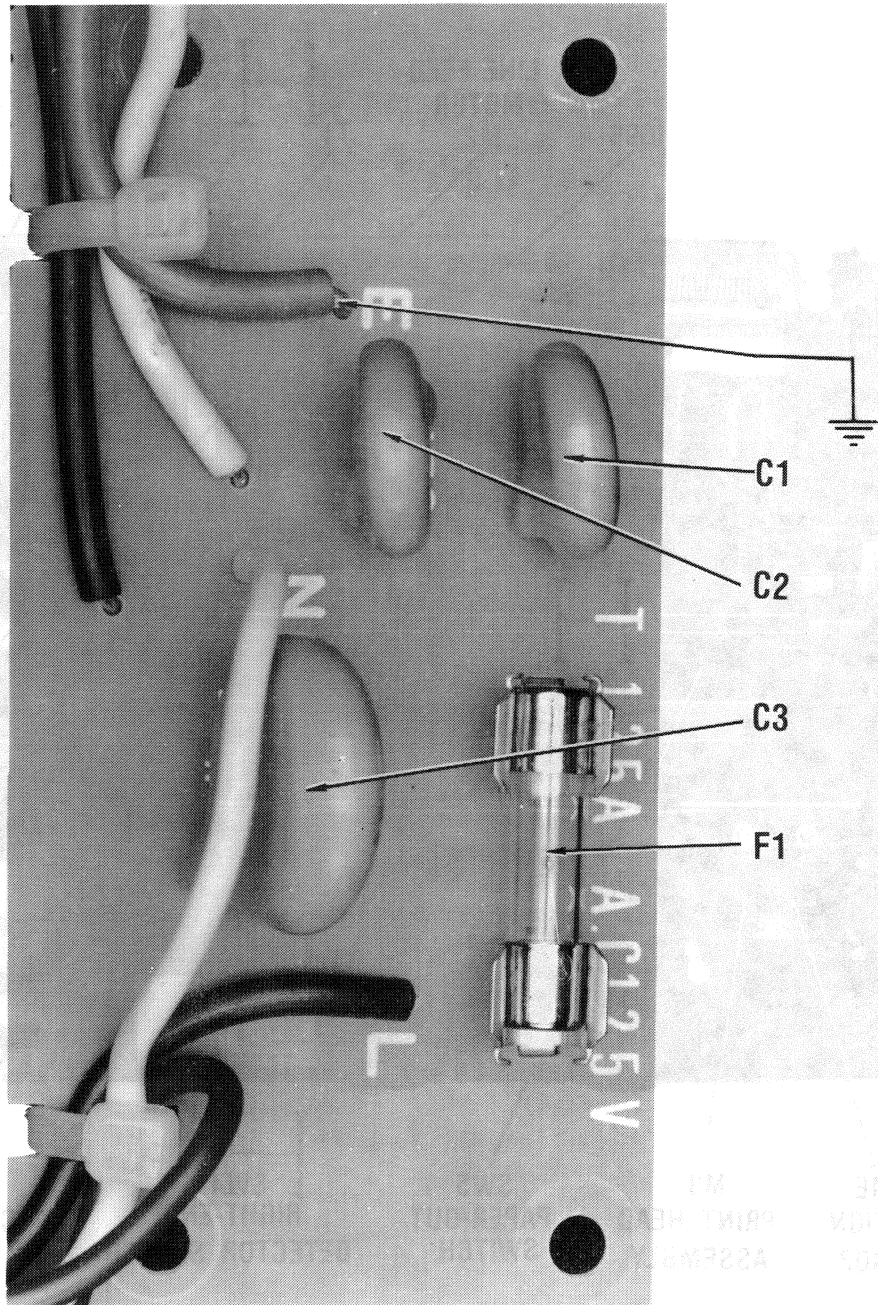
REF. NO.	PART NO.	DESCRIPTION
1	87040331	Frame Base Assembly
2	87040310	Frame R Assembly
3	87040320	Frame L Assembly
4	82090151	Motor Holder
5	82910370	Paper Chute
6	82910380	Sub-Paper Chute
7	81370130	Carriage Stay
8	87040350	Frame Stay Assembly
9	87040360	Roller Holder Assembly
10	87049010	Ribbon Roller Assembly
11	87041011	Carriage Motor Assembly
12	87041020	Paper Feed Motor Assembly
13	87045030	Home Position Detector Board Assembly
14	87045010	Head Cable Board Assembly
15	87049040	Right-End Detector Unit
16	87045041	Paper-Out Detector Board Assembly
17	87029070	Carriage Stay (1) Assembly
18	87042010	Carriage Assembly
19	87043010	Platen Assembly
20	87049030	Paper Clamp Lever Assembly
21	82910360	Platen Cover
22	87049020	Pinch Roller Assembly
23	87029010	Adjusting Plate Assembly
24	87024010	Ribbon Base Assembly
25	87046010	Tractor Unit
26	89070000	Print Head
27	83900170	Adjust Bush
28	82400340	Adjust Lever L
29	87029020	Clutch Lever (1) Assembly
30	82400350	Release Lever

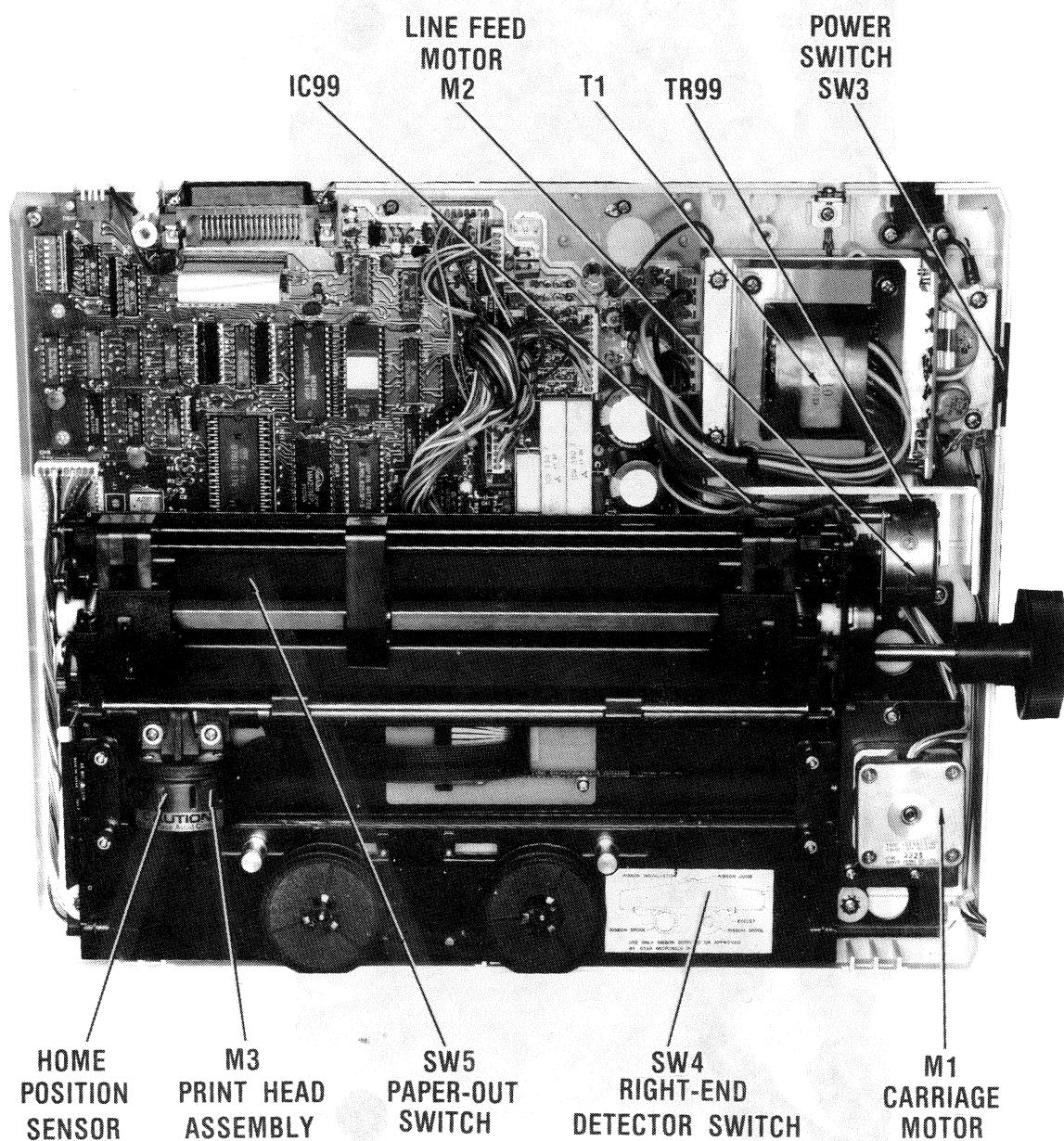
REF. NO.	PART NO.	DESCRIPTION
31	83900260	Release Cap
32	83100120	Idler Gear (1)
33	83120050	Spool Gear
34	83100110	Gear
35	82200010	Collar (1)
36	81220080	Collar (2)
37	82900090	Spring Weight
38	02304050	Thrust Collar
39	83200090	Bush
40	82500200	Wave Washer (5)
41	02307050	Poly-Sider
42	83100100	Idler Gear (2)
43	80530170	Paper Holder Spring
44	80520090	Spool Spring
45	80510280	Release Spring
46	80510240	Paper-Out Detector Spring
47	04020010	Stop Ring E2
48	04020015	Stop Ring E3
49	04020016	Stop Ring E4
50	04020017	Stop Ring E5
51	04012002	Roll Pin SP2-10
52	04012501	Roll Pin SPP2.5-10
53	02010401	Nut N4
54	02040401	Spring Nut N4
55	02203002	Washer W3
56	02110401	Notched Washer WB4
57	01903024	Tapping Screw (M3x10)
58	01903018	Screw with Washer (M3x6)
59	01902018	Tapping Screw with Washer (M2x4)
	04991204	Fastener

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CHASSIS-TOP VIEW

LOGIC CHART

PIN NO.	IC IC1	IC IC2	IC IC3	IC IC4	IC IC5	IC IC6	IC IC7	IC IC8	IC IC9	IC IC10
1	H	P	H	*	P	H	P	L	P	H
2	H	L	L	*	H	L	P	H	P	P
3	L	L	H	*	H	H	H	H	P	H
4	H	P	L	*	P	L	P	L	H	H
5	L	L	L	H	L	L	H	L	P	P
6	H	L	H	L	L	H	H	H	P	P
7	L	P	L	L	P	L	L	L	H	H
8	L	L	H	L	L	L	H	H	L	H
9	H	P	L	H	P	H	P	L	P	P
10	H	L	L	H	H	L	H	L	P	L
11	H	L	L	L	H	H	H	H	P	L
12	L	P	H	H	P	L	P	H	P	P
13	H	L	H	H	L	H	P	L	P	H
14	H	L	H	H	H	H	H	L	P	H
15		H			H				P	P
16		H			H				H	P
17									H	H
18									H	H
19									P	P
20									H	H

PIN NO.	IC IC11	PIN NO.	IC IC11	PIN NO.	IC IC11	PIN NO.	IC IC11	PIN NO.	IC IC12	PIN NO.	IC IC12
1	P	17	P	33	P	49	P	1	H	15	P
2	P	18	H	34	P	50	P	2	P	16	P
3	P	19	L(9)	35	P	51	P	3	P	17	P
4	P	20	L	36	P	52	P	4	P	18	P
5	P	21	L	37	P	53	P	5	P	19	P
6	P	22	H	38	P	54	P	6	P	20	P
7	P	23	L	39	L	55	P	7	P	21	P
8	P	24	L	40	L	56	P	8	P	22	P
9	P	25	H	41	P	57	P	9	P	23	P
10	P	26	H	42	P	58	P	10	P	24	P
11	H(1)	27	H	43	P	59	P	11	P	25	P
12	H	28	H	44	H	60	P	12	P	26	H
13	L	29	H	45	H(8)	61	P	13	P	27	H
14	H	30	P	46	H	62	P	14	L	28	H
15	P	31	P(2)	47	H	63	P				
16	P	32	L	48	H	64	H				

STAR
GEMINI-10X

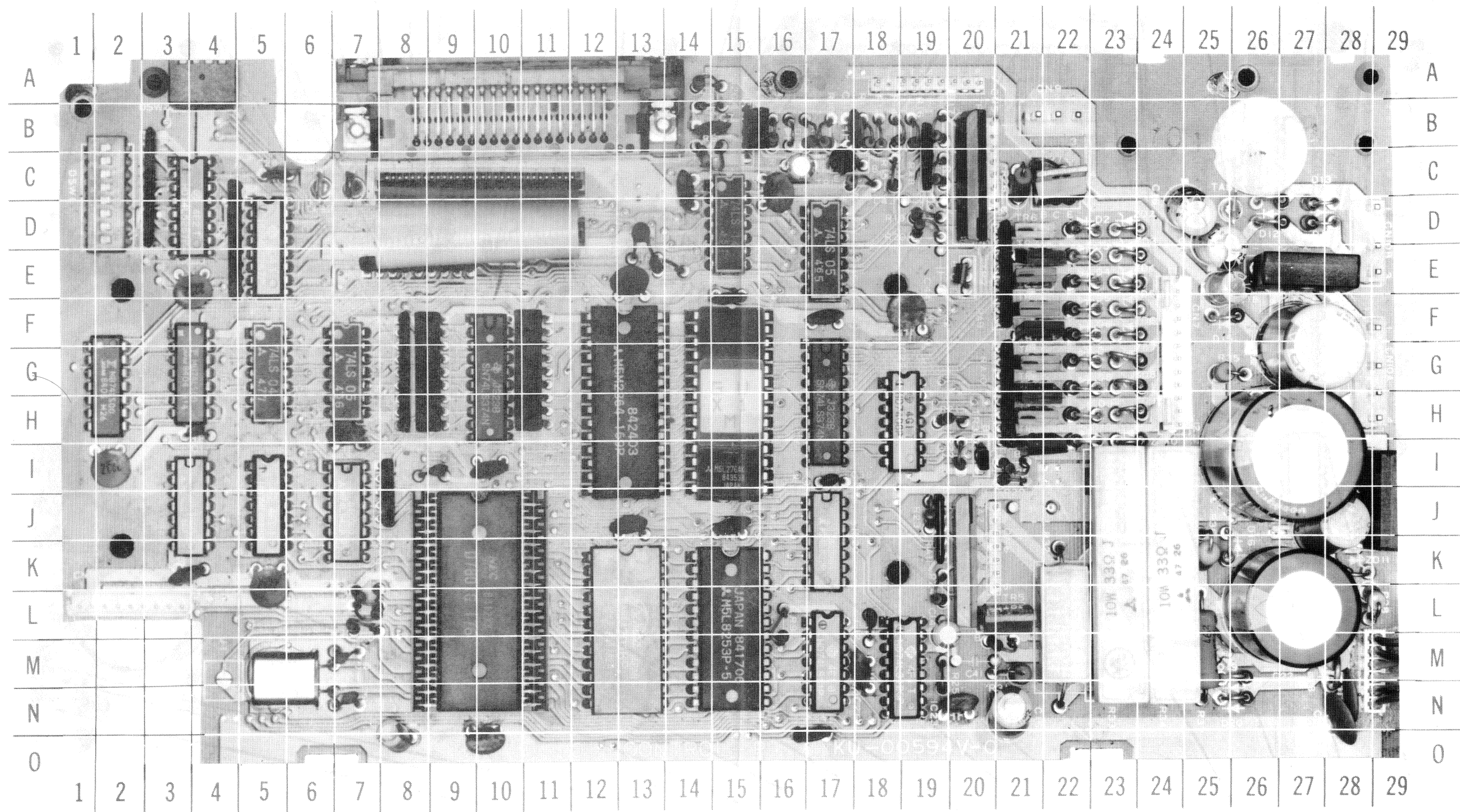
- (1) Pulse when Head is at Home position.
- (2) Do not measure.
- (3) Low when Head is at Home position.
- (4) High when Head is at Home position.
- (5) Pulse during Line Feed.
- (6) Low during Form Feed.
- (7) Low when Carriage Motor changes direction.
- (8) Low when Printer is ON LINE.
- (9) High when Printer is OFF LINE.

Logic Probe Display
 L = Low
 H = High
 P = Pulse
 * = Open (No lights On)

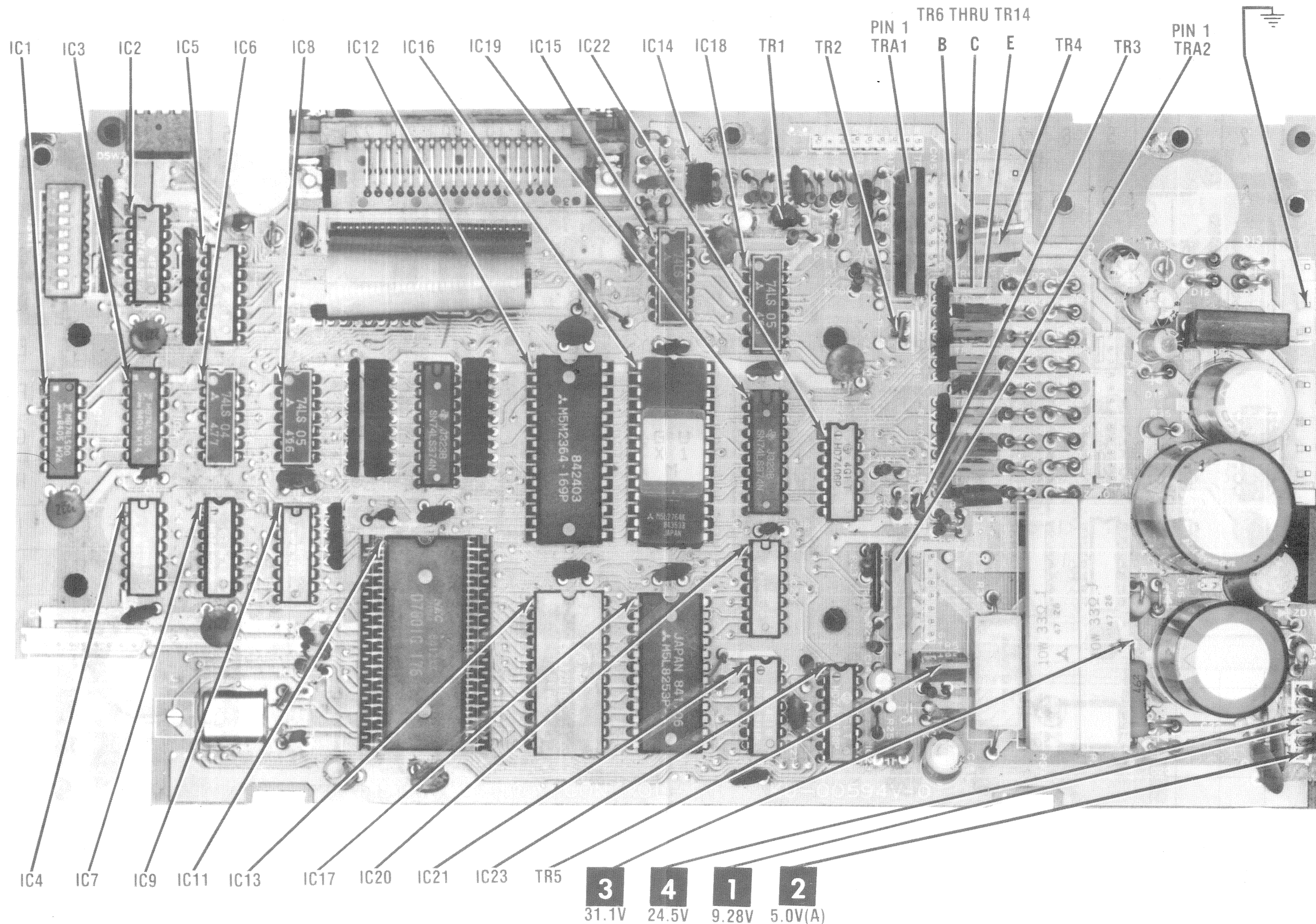
LOGIC CHART (Continued)

PIN NO.	IC IC13	PIN NO.	IC IC13	PIN NO.	IC IC14	IC IC15	PIN NO.	IC IC16	PIN NO.	IC IC16	PIN NO.	IC IC17	PIN NO.	IC IC17
1	P	13	P	1	H	H	1	H	17	P	1	P	13	H
2	P	14	P	2	H	L	2	H	18	P	2	P	14	L
3	P	15	P	3	H	*	3	P	19	P	3	P	15	P
4	P	16	P	4	P	L	4	P	20	P	4	P	16	L
5	P	17	P	5	L	H	5	P	21	P	5	P	17	H(1)
6	P	18	P	6		L	6	P	22	P	6	P	18	P
7	P	19	P	7		L	7	P	23	P	7	P	19	P
8	P	20	P	8		L	8	P	24	P	8	P	20	P
9	P	21	P	9		H	9	P	25	P	9	P	21	P
10	P	22	P	10		P	10	P	26	H	10	P	22	P
11	P	23	P	11		P	11	P	27	H	11	P	23	P
12	L	24	H	12		H(3)	12	P	28	H	12	L	24	H
				13		L(4)	13	P						
				14		H	14	L						
							15	P						
							16	P						
PIN NO.	IC IC18	IC IC19	IC IC20	IC IC21	IC IC22	IC IC23								
1	H(5)	P	L	P	P	P								
2	L(5)	P	P	P	P	H								
3	L(5)	P	P	P	P	H								
4	*(6)	P	L	H	P	L								
5	P	P	L	H	P	H								
6	P	P	L	P	L	*								
7	L	P	L	L	L	*								
8	L	P	H	P	P	L								
9	P	P	H	H	P	*								
10	*(6)	L	H	P	*(7)	*								
11	L(5)	P	P	H	P	*								
12	L(5)	P	P	P	P	L								
13	H(5)	P	P	H	P	H								
14	H	P	H	H	H	L								
15		P				L								
16		P				H								
17		P												
18		P												
19		P												
20		H												

- (1) Pulse when Head is at Home position.
- (2) Do not measure.
- (3) Low when Head is at Home position.
- (4) High when Head is at Home position.
- (5) Pulse during Line Feed.
- (6) Low during Form Feed.
- (7) Low when Carriage Motor changes direction.
- (8) Low when Printer is ON LINE.
- (9) High when Printer is OFF LINE.



STAR
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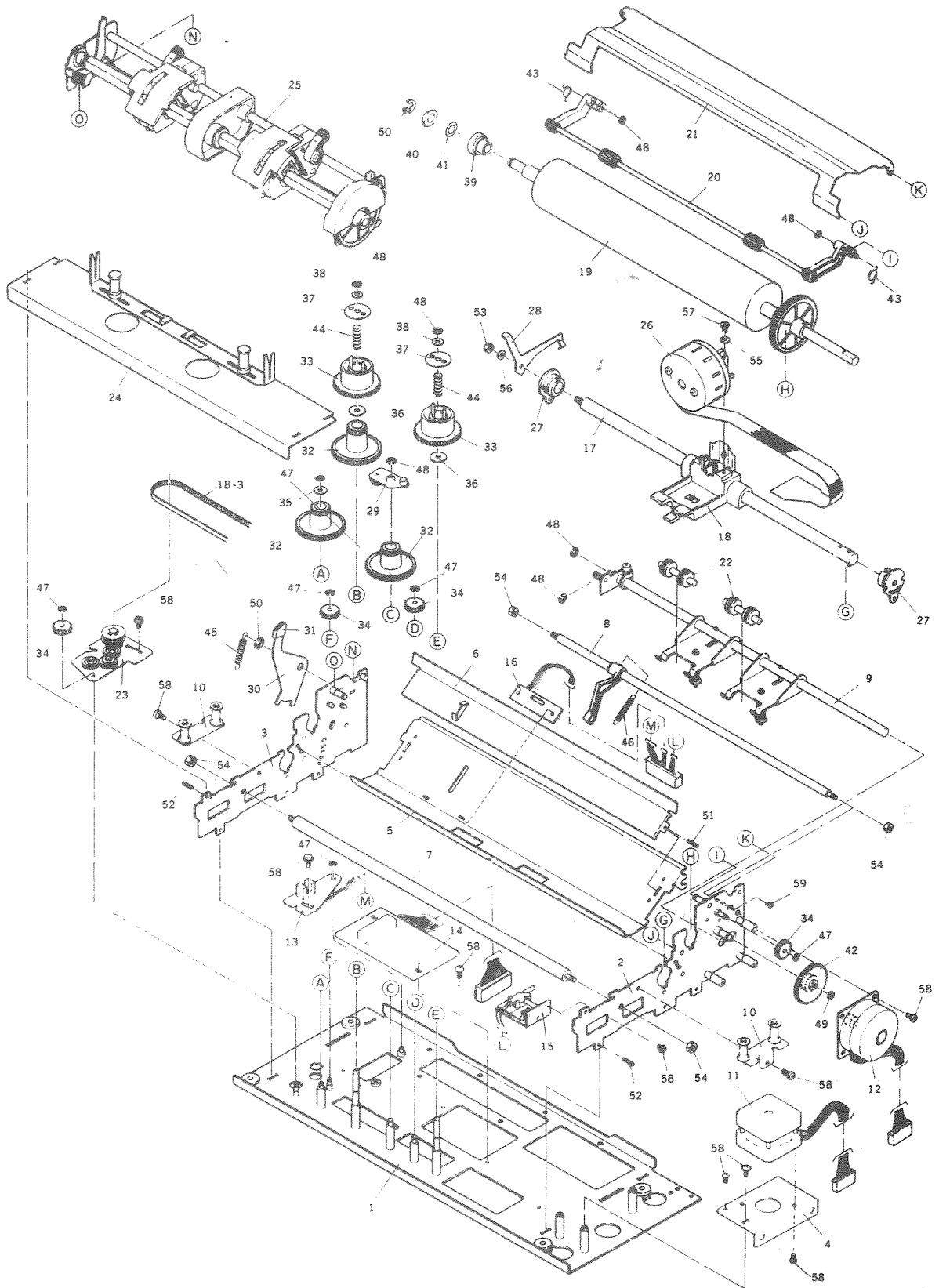
ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED

MAIN BOARD

A Howard W. Sams CIRCUITRACE® Photo

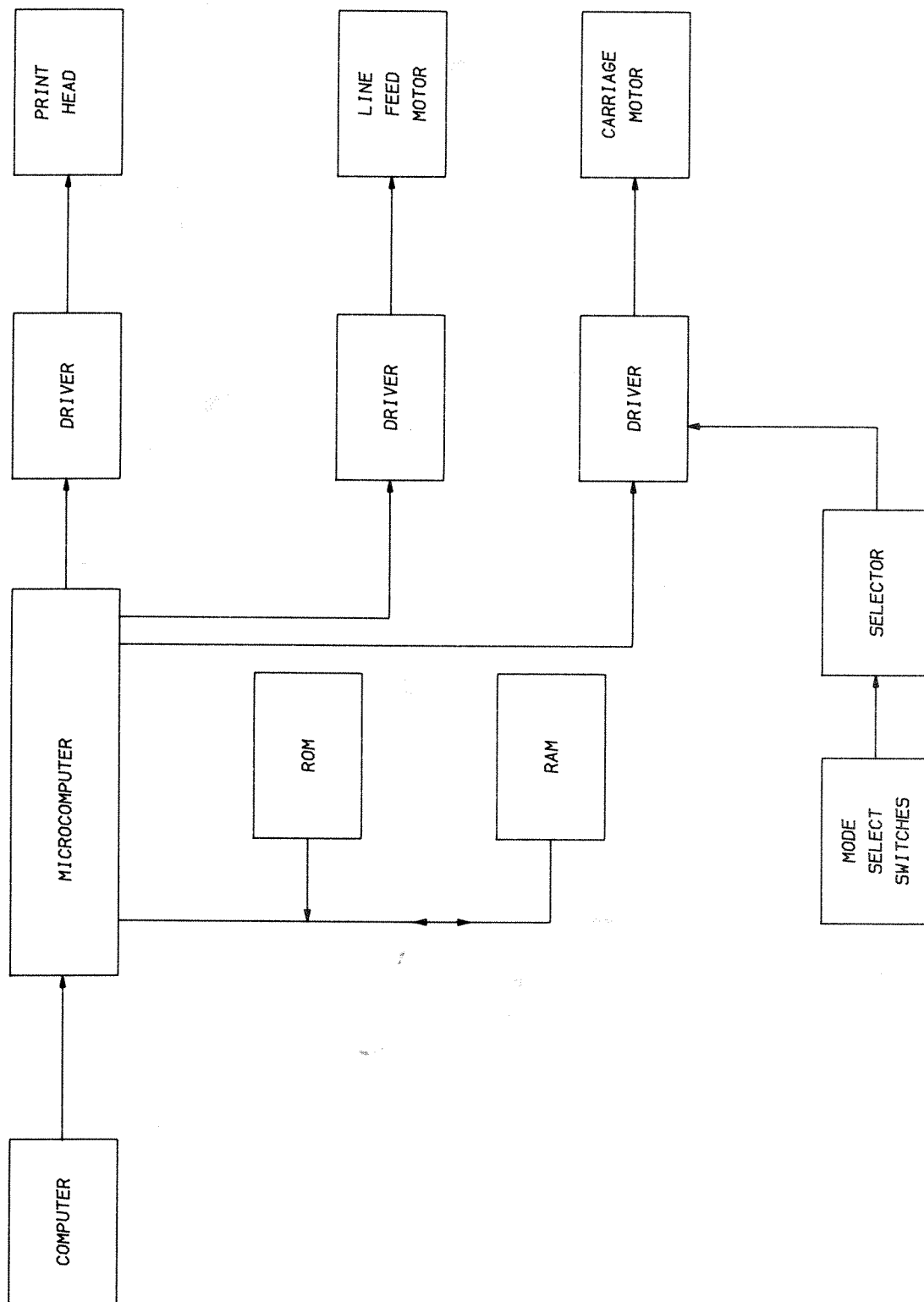
MAIN BOARD

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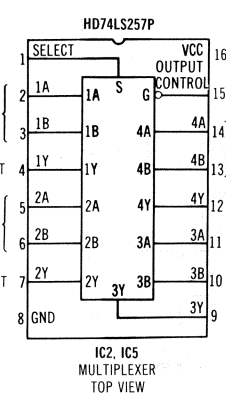
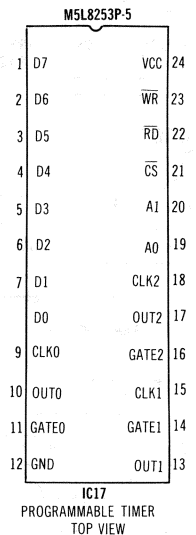
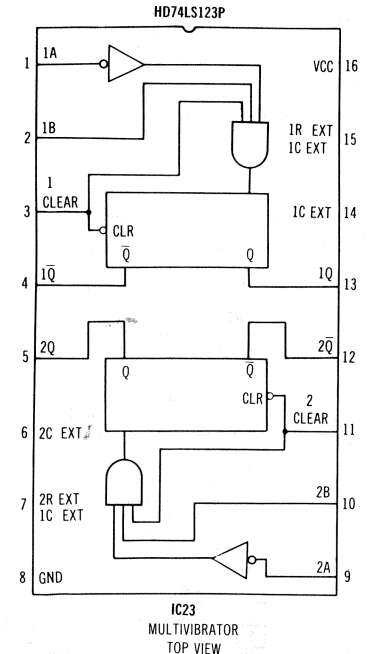
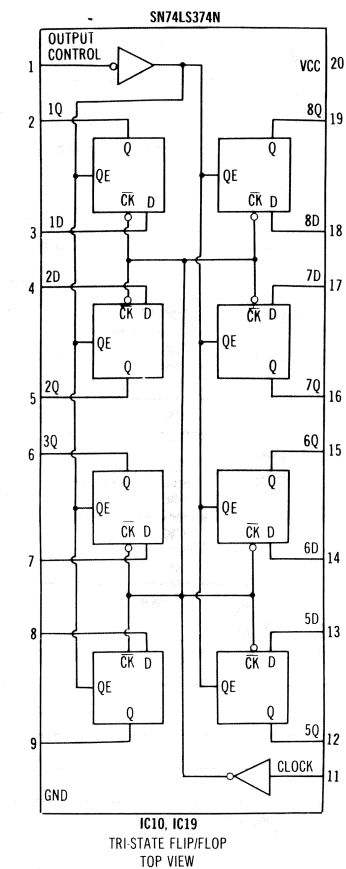
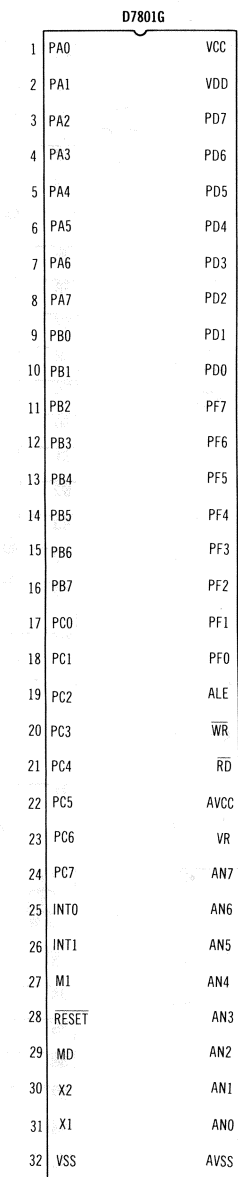
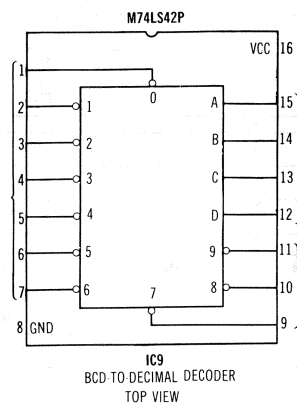
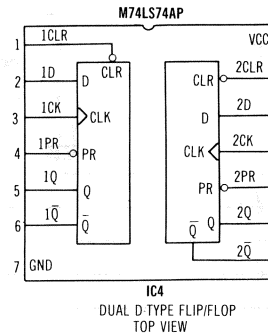
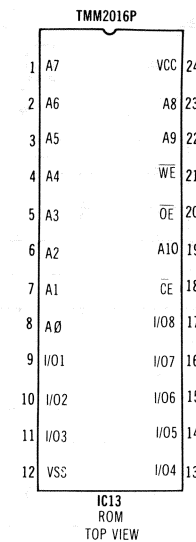
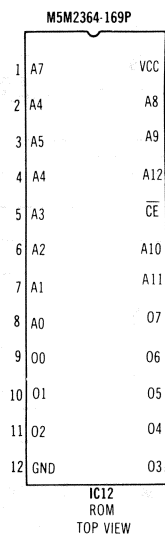
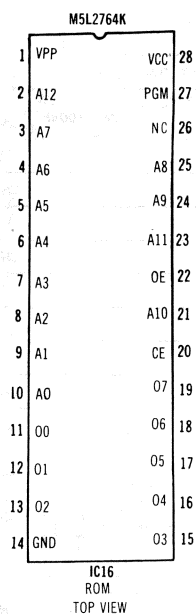
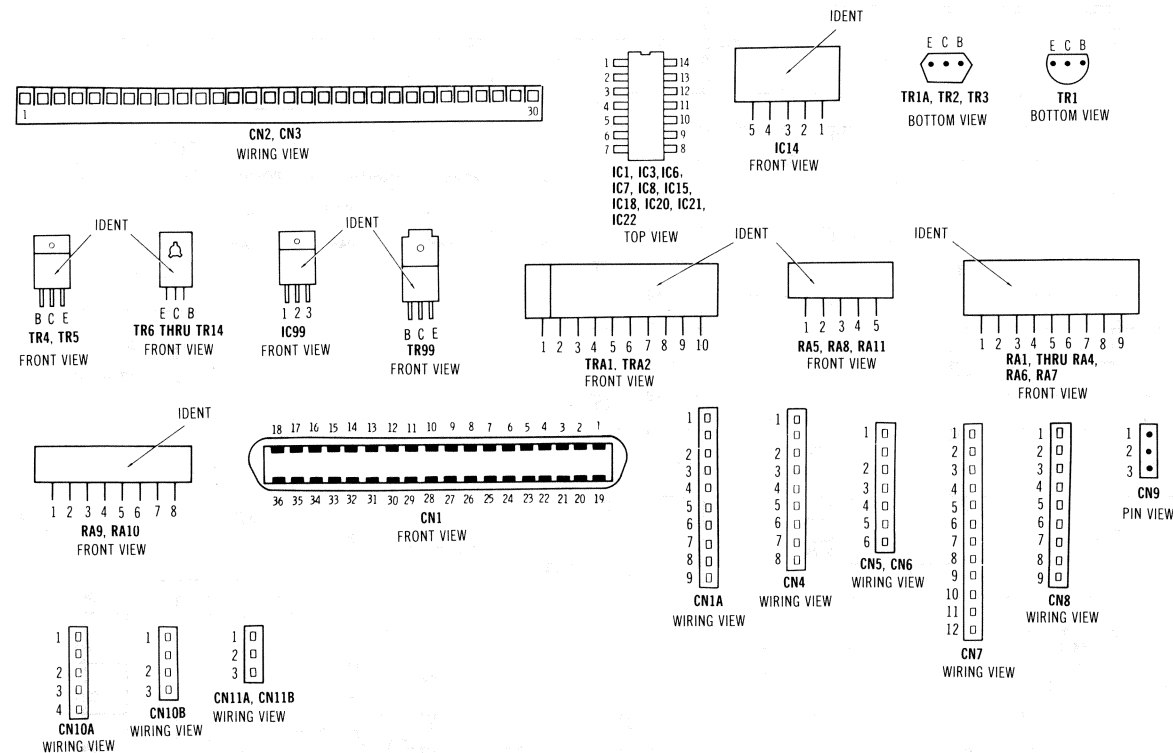
Courtesy of the Manufacturer

MECHANICAL-EXPLODED VIEW



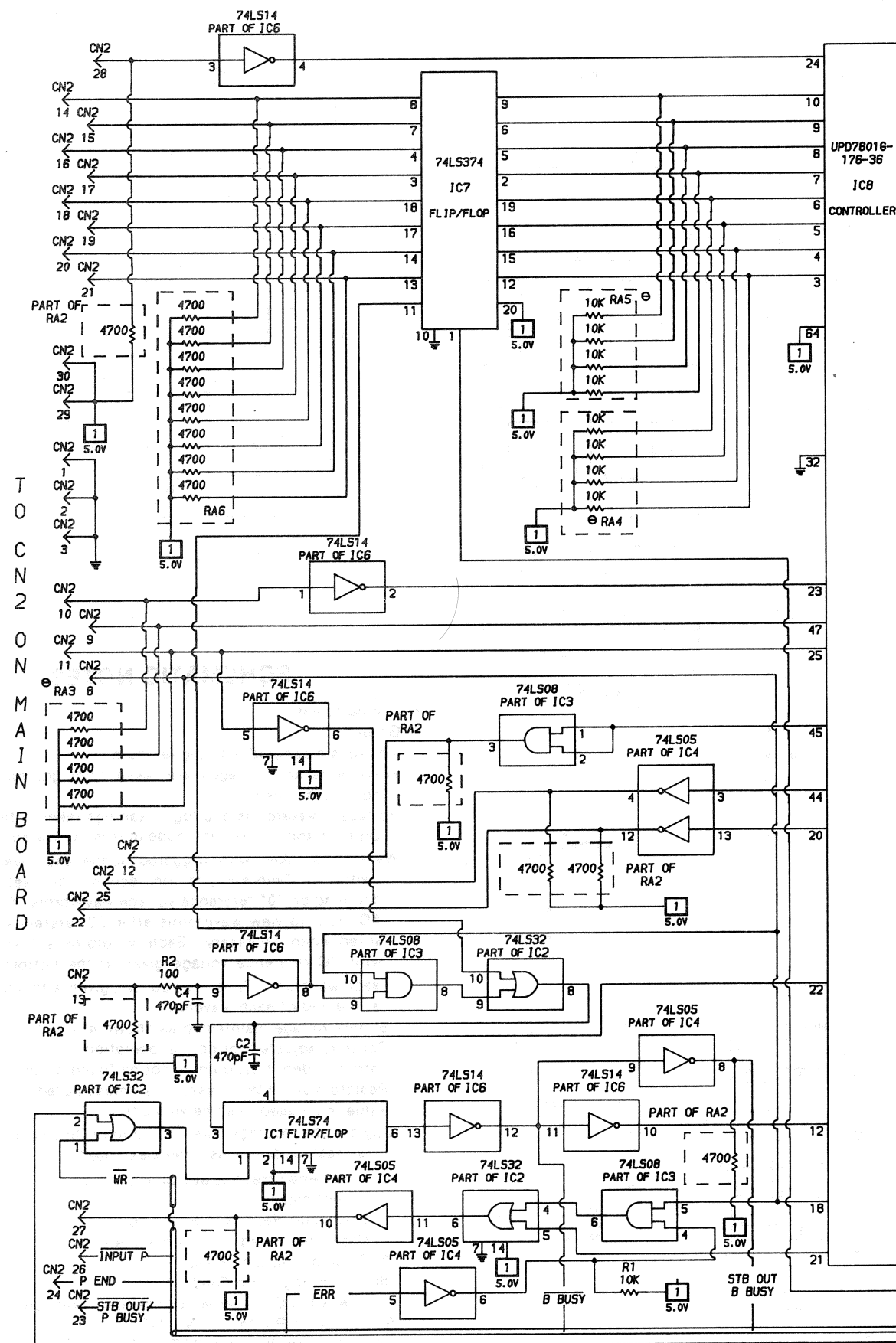
BLOCK DIAGRAM

IC PINOUTS & TERMINAL GUIDES

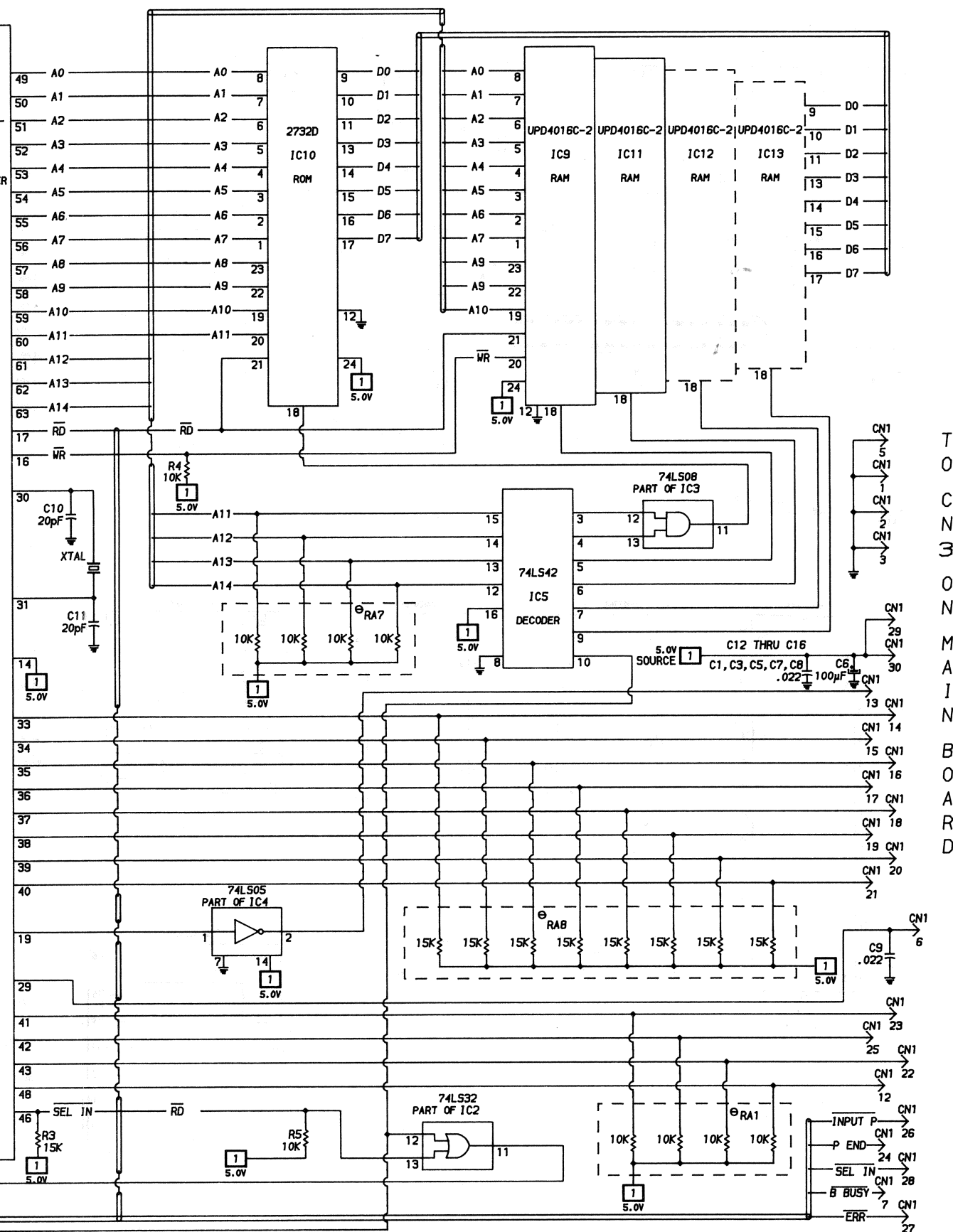


SCHEMATIC NOTES

- See parts list
 - ★ Ground
- Voltages measured with digital meter.
Waveforms and voltages are taken from ground, unless noted otherwise.
- Voltages, waveforms and logic readings taken with printer On Line and in self-test mode unless otherwise noted.
- Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on "0" reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 7.5cm width with DC reference voltage given at the bottom line of each waveform. Time in μ s per cm, given with p-p reading at the end of each waveform.
- Supply voltage maintained as shown at input.
Controls adjusted for normal operation.
Terminal identification may not be found on unit.
Resistors are $\frac{1}{2}$ W or less, 5% unless noted.
Value in () used in some versions.
- Logic probe readings taken with printer On Line and in self-test mode unless otherwise noted.
- (1) Pulse when Head is at Home position.
 - (2) Do not measure.
 - (3) Low when Head is at Home position.
 - (4) High when Head is at Home position.
 - (5) Pulse during Line Feed.
 - (6) Low during Form Feed.
 - (7) Low when Carriage Motor changes direction.
 - (8) Low when Printer is ON LINE.
 - (9) High when Printer is OFF LINE.



INPUT BUFFER



OPTIONAL INPUT BUFFER SCHEMATIC

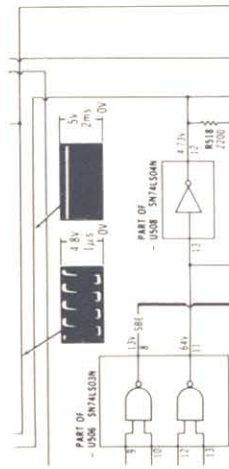
INPUT BUFFER

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CP13

COMPUTERFACTS™ put easy to use, informative technical data right at your fingertips. Each edition includes specific service information on the individual component, along with some overall troubleshooting hints.

- Quick Component Location using the SAMS exclusive GRIDTRACE, CIRCUITRACE, and component photographs.

- Preliminary Service Checks section is an easy to use, step by step guide for the experienced technician or hobbyist, and even beginners.
- SAMS famous industry accepted standardized notation schematics containing CircuitTrace[®] GRID TRACE[™] waveforms, voltages and stage identification.



- Step by Step Troubleshooting guides the technician through the necessary procedures to quickly locate the problem.

Verify the processor is functioning by checking the signals on the address lines pins 22 to 23 of IC U6000 and the logic lines pins 1 through 36 using a logic probe. If a logic probe is used refer to the Logic Chart for the correct readings. If a scope is used the waveforms on the address lines (except pins 22 and 23 which have no signal in Power Up mode) should be similar to Figure 1. The waveforms on the data lines should be similar to Figure 2.

- Logic Chart containing logic probe readings to isolate defective circuitry and components.

[illegible]

- Complete Components Parts List in an easy to use format with field replacements shown when possible. SAMS unique semiconductor, chip and IC cross-reference gives you many replacements to choose from and is available at your Electronic Distributor.

ITEM No	TYPE	MFR PART No	REPLACEMENT DATA						
			ECG PART No	GENERAL ELECTRIC PART No	MOTOROLA PART No	NTE PART No	RCA PART No	WORKMAN PART No	ZENITH PART No
D103	15553	1149-2576	EC9519	GE-514	1N4935	NTE519	5K9091/177	ME925/519	103-131
D105	1N605W	1149-2427	ECG109	1N60	1N4908	NTE 109	5K-108B	ME134/109	103-29001
D201	1N4004GP	1201-4205	ECG116	GE-504A	1N4004	NTE 116	5K3312	ME1157	212-76-02
D501	15553	1149-2576	EC9519	GE-514	1N4935	NTE519	5K9091/177	ME925/519	103-131

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